

**OBESITY PREVENTION POLICY INTERVENTIONS FOR US  
ADULTS: EXPLORING FACILITATORS AND BARRIERS**

by  
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A dissertation submitted to Johns Hopkins University in conformity with the  
requirements for the degree of Doctor of Philosophy

Baltimore, Maryland  
December 2014

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## **ABSTRACT**

### **Background**

The obesity epidemic is one of the most significant public health problems facing the United States (US). Reducing current weight in adults and preventing further weight gain among those already overweight and obese provides a critical opportunity to curb the rising burden of obesity-related morbidity and mortality. As a result, many jurisdictions in the US are considering policy interventions. However, very few policy strategies have been implemented and there is no consensus regarding the most appropriate policies to prevent and control obesity. Therefore, research on the policy process is warranted to understand barriers and facilitators. This study explored framing in the news media during policy consideration; public knowledge, attitudes, and beliefs regarding a policy proposal; and the predictors of enactment of legislation focused on adult obesity prevention and control.

### **Methods**

The goal of this study is to examine the policy process regarding interventions to reduce obesity and related health outcomes in the US adult population. Each of the three studies explored an internal or external factor that influences policy change – the news media, public opinion, and legislation features. News media coverage of the New York City sugar-sweetened beverage (SSB) portion size cap was explored to assess supportive and opposing frames about the policy. Data from a state public opinion survey were used to examine characteristics of supporters of a proposed SSB tax and pro-SSB tax messages. Adult obesity prevention legislation retrieved from a publically available database, as

well as state-level variables were examined to identify patterns and correlates of legislation enactment.

## **Results**

This dissertation illustrated the challenges faced by policy interventions focused on obesity prevention and control in the US adult population. Although there was a general consensus that the obesity epidemic warranted a response, legislation was not a uniformly popular approach and perceptions of the role of government in protecting the public's health were varied. When legislation was considered, framing in the news media and the details of the approach, such as the target population, and how the food environment may change as a result of the intervention were particularly important for successful passage.

## **Conclusions**

This dissertation provides novel evidence on some of the barriers and facilitators to the policy process and offers an important first step in understanding why few adult-focused obesity prevention policy interventions have been successfully enacted and implemented to date. The influence of the news media, public opinion, and legislation characteristics should be considered by advocates, researchers, and policymakers seeking to slow the adult obesity epidemic in the US through policy change.

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## **ACKNOWLEDGEMENTS**

I would like to thank the many people that provided invaluable guidance and encouragement during my doctoral training. First, I would like to thank my advisor, Dr. Joanna Cohen for her tremendous mentorship. Joanna was always willing to meet with me to discuss facets of my research and career both large and small. She provided essential expertise throughout my doctoral training and during my dissertation research. She was unwavering in her dedication to my education and professional development and I am very grateful to have benefited from her insight and support. Second, this dissertation research would not be possible without the advice and encouragement provided by my thesis advisory committee members- Dr. Colleen Barry, Dr. Lainie Rutkow, Dr. Andrea Villanti, and Dr. Norma Kanarek. Colleen was a critical advisor from the development of my proposal through completing my dissertation research, particularly for the news media content analysis. She helped me to connect with other students doing this work and was always willing to discuss areas of concern and moments of triumph during this research. Her work ethic and mentorship are examples that I will take with me in my career. Lainie was a constant source of encouragement and I feel very fortunate to have her as a mentor. She was always available to provide constructive advice early on in my doctoral training and during my dissertation research. She helped me to trust my instincts and kept me motivated and encouraged when challenges arose in the research process. Andrea and Norma provided critical feedback and kind words of wisdom throughout the process. I am fortunate to have had support from this outstanding group of advisors during my dissertation research. I would also like to thank the members of my oral exam committees for their advice early in the development of this

research- Dr. David Abrams, Dr. Katherine Smith, Dr. Karin Tobin, and Dr. Kay Dickerson.

I am especially grateful for the funding that gave me the flexibility and time to conduct this research and greatly enhanced my doctoral training by expanding my network of mentors and friends, and exposing me to new areas of public health. I would like to thank Dr. Elizabeth Platz for her mentorship. Support for my doctoral training was provided by the National Cancer Institute's Cancer Epidemiology, Prevention, and Control Training Fellowship (T32 CA009314) and support for this dissertation research was provided by the Center for a Livable Future-Lerner Fellowship.

My friends near and far – Liz Parker, Kate Johnson, Patti Truant, Melissa Kivitz-Krantzow – I could not have done this without their incredible support.

I would like to give a very special thanks to my family. They served as my constant source of wisdom, laughter, and inspiration throughout my doctoral training. My sister, Sarah Donaldson, is always there when I need a word of reassurance or a laugh. Sarah never ceases to amaze me with her intellect and her incredibly generous spirit. My father, Robert Donaldson, provides an example that I strive to emulate in my life and career with his tremendous work ethic and his never-ending desire to learn and to help others. He provided encouragement when I needed it most from the perspective of someone who knows me best. My mother, Carolyn Donaldson, is my biggest cheerleader and is always ready with an astute and inspiring note. She is one of the most selfless people I know and her unwavering dedication to our family and her community is one of her many qualities that I admire. The Shermans- Donna, Bill, Michael, Mere, and Lenni- have also been a wonderful source of support.

Finally, I would like to thank my husband – Brian Sherman. He has been steadfastly by my side sharing in the numerous joys and frustrations that have accompanied my doctoral training and dissertation research. He listened to countless moments of panic when challenges arose and provided critical intellectual and emotional support in every step of the process. By his example in working hard and facing new challenges in stride, he encourages me to challenge myself a little bit more each day. Most importantly, he helps me to laugh and enjoy our wonderful life. While he has been my best friend and core supporter for over 8 years, my doctoral training has taken place alongside two significant events in our lives- our wedding three years ago and the birth of our incredible daughter Grace 7 months ago. Despite the many ups and downs of my doctoral training, we will always consider this a very special time in our lives for the great joy that our marriage and Grace has brought us.

## **DEDICATION**

This dissertation is dedicated to Grace Kathryn Sherman. Gracie- you remind us every day that life is a beautiful gift and that we should take in every second of this adventure.



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## **CHAPTER 1- INTRODUCTION AND LITERATURE REVIEW**

## **Background and Significance**

Globally, the prevalence of overweight and obesity is increasing in both high and low-and middle-income countries.<sup>1</sup> Body mass index (BMI), calculated as weight in kilograms divided by height in meters squared, is an indicator of body fat most often used to categorize individuals as overweight or obese.<sup>2</sup> In adults, an individual with a BMI greater than 25 kg/m<sup>2</sup> is classified as overweight and those with a BMI exceeding 30 kg/m<sup>2</sup> are considered obese.<sup>2</sup> More than 1 billion adults over the age of 20 are overweight and over 300 million of these individuals are obese.<sup>1</sup> According to the World Health Organization (WHO), approximately 2.8 million adults die every year as a result of being overweight or obese.<sup>1</sup>

Over the past three decades, obesity has emerged as a critical public health issue as prevalence in the United States has more than doubled among adults and tripled among children.<sup>3,4</sup> According to data from the 2009-2010 National Health and Nutrition Examination Survey (NHANES), 35.5% of men and 35.8% of women over the age of 20 are currently obese.<sup>5</sup> The prevalence of obesity in children and adolescents is approximately 17%.<sup>5</sup> In examining the last decade of NHANES data (1999-2010), the prevalence of overweight and obesity remained steady in the US among women and girls overall. However, the prevalence has increased among men from 27.5% to 35.5% and among boys from 14% to 18.6%.<sup>5</sup> Pan et al. (2011) examined the incidence of obesity in adults ages 18 to 44 using data from the Behavioral Risk Factor Surveillance System (BRFSS) and found an annual obesity incidence of 4% per year.<sup>6</sup> Incidence rates were highest among young adults, ages 18 to 29 years (6.4% for BMI  $\geq$ 30 kg/m<sup>2</sup>). The high

incidence suggests that this age group may be an important target for obesity prevention and control efforts.<sup>6</sup>

In exploring adult obesity trends by geographic region, nineteen states in the US have a prevalence of obesity that is 30% or greater.<sup>7</sup> Six states- Alaska, Delaware, Idaho, New Jersey, Tennessee, and Wyoming- experienced a statistically significant increase in obesity prevalence between 2012 and 2013.<sup>7</sup> Mississippi and West Virginia lead the nation with the proportion of obese adults at 35.1%.<sup>8</sup> In addition, obesity prevalence in rural areas tends to be higher as compared to urban populations in the US.<sup>9-11</sup>

Given the persistent trend of overweight and obesity in the US population, the related morbidity and mortality will have an increasingly deleterious impact. Overall, as body mass index rises, the risk of obesity-related morbidity increases.<sup>12</sup> Even a small increase in weight among individuals of normal weight has implications for metabolic function, diabetes, heart disease, and cancer risk.<sup>12-18</sup> Overweight and obesity in adults are associated with several adverse health outcomes including cardiovascular disease<sup>12,13</sup>, type II diabetes mellitus<sup>14</sup>, various cancers including colon, breast, prostate, kidney, endometrium, and gallbladder cancer<sup>15-18</sup>, as well as psychological issues such as depression.<sup>19-21</sup> Each year in the US, an estimated 100,000 deaths are attributed to obesity<sup>22</sup> with an estimated 25,000 deaths per year from sugar-sweetened beverages alone.<sup>23</sup>

As a result of the trend in weight gain in the US population and obesity-attributable disease, the economic burden is substantial. Each year, disability and disease attributed to overweight and obesity costs \$147 billion 2008 USD in direct medical costs.<sup>24</sup> Simulation models constructed by Wang et al. (2011) and Finkelstein et al.

(2012) suggest that between 42-50% of Americans will be obese by the year 2030.<sup>25,26</sup> Furthermore, Wang et al. (2011) estimated that in the next twenty years, the projected rise in obesity prevalence will lead to 6 million cases of type 2 diabetes, 5 million cases of coronary heart disease and over 400,000 cases of cancer.<sup>25</sup>

While overall prevalence in both women and men remains high in the US, the change in prevalence over time differs by income, education, and racial and ethnic groups. Between 1999 and 2010, although obesity did not increase among women overall, when examined by racial and ethnic group, obesity increased among African American and Mexican American women.<sup>27</sup> The prevalence of obesity remains high in most racial, ethnic, and socioeconomic status groups in the US.<sup>27</sup> However, many racial and ethnic groups have a higher relative prevalence as compared to whites and that difference has remained over time.<sup>28</sup> There is also a relative difference in obesity prevalence among adults who completed college as compared to those who did not graduate high school, 23% and 42% among women, respectively.<sup>29</sup> In regard to income disparities, the association between income level and obesity prevalence for adults has a more pronounced gradient among women than men.<sup>29</sup> Women with incomes more than 130% below the poverty line (less than \$29,000 for a family of four in USD 2008) had an obesity prevalence of 42% as compared to 29% among those in the highest income group (approximately \$77,000 for a family of four in USD 2008).<sup>29</sup> Correlates of weight gain, such as physical inactivity and poor diet are also higher among low income communities.<sup>30-33</sup> Therefore, the impact of obesity and related disability and disease disproportionately impacts low income communities, as well as African American and Mexican women.<sup>34-36</sup>

## **Literature Review**

The obesity epidemic remains a significant public health problem across the US. Research continues to emerge regarding the factors contributing to the problem that can inform public health solutions. This section reviews relevant frameworks for understanding the contributors to the US obesity epidemic. A literature review follows that summarizes the evidence on the multi-level influences on obesity. The review focuses on the role of sugar-sweetened beverage (SSB) consumption and public health policy approaches to address SSBs and other obesity risk factors.

### ***Systems and Ecological Approaches***

Ecological and systems approaches are often applied to describe the obesity epidemic's complex set of contributing factors.<sup>37-43</sup> Although not a theory, ecological frameworks and models that take a systems approach, including the example presented in **Figure 1-1**, are useful for understanding a public health issue such as obesity that is informed by multiple theories and influenced by factors at multiple levels. The framework provided in **Figure 1-1** provides one example of how the contributors to an individual's dietary patterns are depicted conceptually as the product of a broader system of influences that spans several theoretical perspectives.<sup>42, 43</sup> A systems framework developed by Glass and McAtee (2006) provides another way to understand health behaviors related to obesity that are influenced by factors that span multiple levels (e.g. environmental, interpersonal, and individual) across the life course.<sup>44</sup> Their model is comprised of dynamic feedback loops, as well as risk regulators, or factors that function between the macro and individual levels, such as the local food environment.<sup>44</sup>

While also adopting an ecological perspective, Cohen et al. (2000) and Swinburn et al. (1999) developed frameworks for conceptualizing the role of the environment in population-level health behaviors and for identifying points for intervention.<sup>40,46</sup> Cohen et al. (2000)'s model defined four factors that constitute broad aspects of the environment that influence health behaviors – 1) product availability; 2) the physical characteristics of products or neighborhoods; 3) social structures including legislation and policies; and 4) media and cultural messages.<sup>45</sup> Swinburn et al. (1999) used a similar set of four factors to explore contributors to obesity and looked at each factor across two types of environment – micro settings, such as schools, and macro sectors, such as the media.<sup>40</sup> In 2011, Swinburn and colleagues constructed another framework to describe the multiple determinants of the global obesity epidemic and to highlight potential solutions, including policy interventions.<sup>46</sup> Lastly, Frieden (2010) proposed a framework in the shape of a pyramid that is useful for evaluating the potential impact of an intervention in contrast to the level of effort needed on the part of the individual.<sup>47</sup> The framework suggests that interventions focused on modifying underlying socioeconomic factors would have the most impact on population health outcomes. The next layer includes policy interventions aimed at changing the environment in which individuals make decisions. The author contrasts this layer of the framework with clinical and individual counseling that would be more resource-intensive.

Systems-oriented models are helpful, particularly in understanding the obesity epidemic, because the epidemic has several contributors at multiple levels.<sup>44</sup> The individual theories within this broader ecological approach that guide the current study are described in the conceptual framework section. However, first, a review of the

literature is presented regarding the contributors to obesity with a particular focus on sugar-sweetened beverage (SSB) consumption. This review's purpose is to use an ecological or systems approach to briefly introduce the contributors to obesity and to explore the drivers and consequences of SSB consumption with a focus on the role of policy interventions.

### ***Contributing Factors to the Obesity Epidemic***

The risk factors that contribute to the obesity epidemic are varied and complex. Weight gain in an individual is a function of interactions between genetic, behavioral, cultural, and environmental factors.<sup>48</sup> The primary mechanism thought to drive weight change in an individual is an energy imbalance<sup>49</sup> in combination with the genetic environment<sup>50</sup> and epigenetic mechanisms.<sup>51</sup> Energy imbalance is the dynamic tradeoff between caloric intake from food and beverages as compared to calories expended during actions such as physical activity.<sup>49</sup> A consistent energy imbalance of 50 to 100 kcal per day may be associated with weight gain.<sup>49</sup> The evidence illustrates that increased energy intake and the resulting energy imbalance are associated with the rising prevalence of weight gain and obesity.<sup>46,52-54</sup> A proximate cause of this imbalance are interactions between an individual's biological susceptibilities, characteristics such as age, gender, education, as well as behaviors, such as sugar-sweetened beverage consumption<sup>55</sup>, the amount and type of calorie-dense food consumed<sup>56</sup>, and level of physical activity.<sup>57</sup> An energy imbalance, in combination with underlying biological susceptibility, can lead to weight gain.<sup>58</sup> However, since there is no evidence to suggest that biological susceptibility to weight gain has changed within the past 30 years, there is an increasing

focus on the environmental factors that lead to increased energy intake and reduced energy expenditure.<sup>46,58-61</sup>

As noted, there is a growing consensus that interpersonal, community, and environmental contexts have driven the changes observed in individual behavioral risk factors and the resulting energy imbalance.<sup>46,58-61</sup> Interpersonal factors, the availability of food in the home, television watching, and parental modeling of eating and exercise behaviors, have been shown to influence individual and household dietary and exercise practices.<sup>62</sup> Christakis and Fowler (2007) examined obesity within social networks among the Framingham Heart Study cohort.<sup>63</sup> The authors observed that an individual's likelihood of being obese increased if a sibling, peer, or spouse was obese.<sup>63</sup> Within a community or neighborhood, the built environment, including the amount of recreational space and other neighborhood-level factors, influences individual behavior. The availability and accessibility of healthy foods, such as fruits and vegetables, is a built environment contributor to the obesity epidemic.<sup>64,65</sup> For example, neighborhood characteristics such as street connectivity, the quality of sidewalks, and access to recreational facilities are associated with daily physical activity levels.<sup>65</sup> Furthermore, a systematic review by Lovasi et al. (2009) observed that most of the included studies found an association between poor supermarket access and obesity among low income, African American, and Hispanic communities.<sup>66</sup>

In exploring societal trends and environmental drivers of the obesity epidemic at the population level, changes in the global food system including a shift toward processed foods with added sugar and fat are associated with increased energy intake.<sup>46, 67, 68</sup> Evidence highlights the importance of factors such as food prices as an important



contributor.<sup>69</sup> Since the 1980s, there has been a decrease in the price of foods with high caloric-density, relative to the price of fruits and vegetables.<sup>70,71</sup> For example, between 1985 and 2000, the price of fresh fruits and vegetables increased by 118% as compared to a 20% increase in the price of carbonated soft drinks.<sup>70,71</sup> As the relative price of high-caloric or energy-dense foods decreased, the amount of food consumed at each meal also increased. In addition, a greater proportion of US adults are consuming energy-dense foods, including sugar-sweetened beverages.<sup>72,73</sup>

The obesity epidemic is being driven by multiple contributing factors at each level of influence –individual, interpersonal, and environmental. While no contributor is solely responsible for the epidemic, a growing body of literature has examined sugar-sweetened beverage (SSB) consumption as an important contributor to the US obesity epidemic.<sup>73-75</sup> The following section will explore this category of food further, including trends in consumption and its relationship to obesity.

### ***The Role of Sugar-Sweetened Beverage Consumption in the US Obesity Epidemic***

Sugar-sweetened beverages (SSB) are defined in this dissertation as beverages containing added sugar or syrups, such as sucrose and high-fructose corn syrup (HFCS) that are extrinsic to the product; and therefore, are added during processing, manufacture, packaging, or preparation.<sup>76</sup> Although sucrose is added to some SSBs, most of the beverages are sweetened with HFCS.<sup>77</sup> In addition, approximately 66% of the HFCS intake in the US is from consuming SSBs.<sup>78</sup> Sucrose and HFCS are thought to have similar short-term physiologic effects on the body, such as impacting blood glucose levels, insulin levels, and others.<sup>79</sup> Both sucrose and HFCS are comprised of the

monosaccharides fructose and glucose, although in slightly different proportions (50% fructose, 50% glucose in sucrose; and 55% fructose, 45% glucose in HFCS).<sup>78</sup> The SSB definition used in this dissertation includes sugar-sweetened carbonated drinks, sports drinks, ready-to-drink teas and coffees, less than 100 percent fruit drinks, and other beverages that contain added sugar.

As the leading source of added sugar in the US diet, Americans are consuming SSBs in excess and to the detriment of their health.<sup>72,73</sup> Since the 1970s, SSB consumption has almost tripled.<sup>80</sup> Bleich et al. (2009) explored national data from the National Health and Nutrition Examination Survey NHANES and compared SSB consumption between 1988-1994 and 1999-2004.<sup>73</sup> The authors observed a significant increase in the proportion of US adults over the age of 20 years that consumed SSBs, increasing from 58% to 63%.<sup>73</sup> In 1999-2004, adults consumed, on average, a total of 28 ounces of SSBs per day and 17 ounces on each drinking occasion.<sup>73</sup> According to Ogden et al (2011) using NHANES data between 2005-2008, the total percentage of the population over age 20 consuming SSBs was around 50%.<sup>74</sup> Lastly, Welsh et al. (2011) explored the consumption of added sugar using the most recent NHANES data in 2007-2008 and observed an overall decrease in added sugars.<sup>72</sup> However, despite a decrease in the consumption of soda within the SSB category when comparing data from 1999-2000 and 2007-2008, SSBs remain the leading contributor of added sugar relative to other sources such as cakes and candies.<sup>72</sup> Based on the 2007-2008 NHANES data, adults ages 20 to 34 consumed 338 kcal/day from SSBs and adults over age 35 consumed 236 kcal/day.<sup>72</sup>

SSB consumption represents between 6 to 8% of total daily caloric intake among US adults.<sup>72,74</sup> Although SSB consumption remains high in the US population as a whole, it varies by income level, as well as racial and ethnic group. Individuals living more than 130% below the poverty line have the greatest proportion of total calories from SSBs compared to higher income groups.<sup>74</sup> NHANES data illustrate consistently over time that African Americans and Mexican Americans have a higher prevalence of sugar-sweetened beverage consumption as compared to non-Hispanic Whites.<sup>73,74</sup>

It is important to note that the three studies of NHANES data provided above categorize SSB differently, with Bleich et al. (2009) using the most inclusive definition of SSB by including NHANES data on the consumption of sweetened teas and low-calorie drinks, such as fruit juices, as compared to Ogden et al. (2011) and Welsh et al. (2011) who did not include these beverage types in their overall SSB categories. In summary, a large proportion of US adults are daily SSB consumers, and these beverages remain the largest contributor to added sugar intake in the US.

Reasons for the SSB consumption trends are multifaceted. Studies suggest a wider variety of available flavors, larger portions, and the increased visibility and proximity of food items have influenced consumption.<sup>81-83</sup> In addition, the decrease in the relative price of energy-dense foods, in combination with the rising popularity of “supersizing” have contributed to an increase in the portion sizes of beverages at each meal.<sup>75</sup> Nielson and Popkin (2003) observed the trend in increasing portion sizes by comparing serving sizes in 1977-1978 to 1994-1996 with the largest increases occurring in serving sizes of sweetened beverages including soda and fruit drinks.<sup>75</sup> Between 1977 and 1996, the average size of a soda increased from 13 to almost 20 fluid ounces.<sup>75</sup>

Between this time period, there was an increased intake of soda, 49 kcal/day, among the US population over 2 years of age.<sup>75</sup>

Another contributor to the high prevalence of SSB consumption may be the effect of food and beverage advertising on consumer preferences. In 2001, the annual advertising budget for beverage, snack chips, and candy companies was approximately 820 million USD with many advertisements focusing on energy-dense foods.<sup>84</sup> Among children and adolescents, studies have found a positive association between viewing food advertisements on television and preference for the brands promoted.<sup>85-87</sup>

### ***Sugar-Sweetened Beverage Consumption and Health***

#### *Consumption patterns and physiological mechanisms*

The literature suggests several possible mechanisms linking the consumption of SSB to individual weight gain, obesity, and disease outcomes, such as type 2 diabetes and cardiovascular disease. The relationship between SSB consumption and total energy or caloric intake has been examined in the literature both regarding the absolute contribution of added sugar to total caloric intake, as well as the role of SSBs in displacing intake of comparatively nutrient-rich foods. Several studies have observed that consumption of SSBs displaces nutrient-dense beverages, or those with nutritive value, including milk, and 100% fruit juice.<sup>88-90</sup> In addition, DeCastro (1993) and Mourao et al. (2007) found that consuming beverages does not have the same effect on satiation as compared to solid foods. In other words, SSBs may not satiate an individual in the way that the same caloric intake from solid foods satisfies hunger.<sup>91,92</sup> In addition, Flood et al. (2006) conducted an experimental study in which participants were served different sizes of

water, diet soda, and regular soda during lunch.<sup>93</sup> Participants did not compensate for the caloric intake from beverages by reducing the total calories consumed during the meal.<sup>93</sup> Therefore, when the participants consumed a regular soda with lunch they had a significantly higher mean total caloric intake as compared to the days when they drank a non-caloric beverage at lunch.<sup>93</sup> In addition, when the portion size of each beverage type was increased, participants consumed 50% more of the beverage as compared to when they were offered the smaller size.<sup>93</sup> A difference in response to calories consumed from beverages and solid foods may mean that individuals consuming SSBs net more total caloric intake.

The recommended daily caloric intake for most adults in the US is between 1,500 kcal/day to 2,000 kcal/day.<sup>94</sup> Currently, the US Department of Agriculture's Dietary Guidelines for Americans recommends that depending on physical activity, a typical woman should have no more than 80 kcal/day of added sugar and a typical man should have no more than 150 kcal/day.<sup>94,95</sup> Therefore, one 12-ounce can of regular soda containing an average 140-150 calories from sugar, would exceed the daily intake for women and come close to exceeding the intake for men.<sup>96</sup> Based on the current trends in SSB consumption discussed in the previous section, these minimum recommended values continue to be exceeded in the US population. Therefore, the relative and absolute contribution of calories from added sugar in SSBs may be contributing to population weight gain.

In addition to the impact of SSBs on total energy intake and possible weight gain, some literature supports a direct mechanism between SSB intake and the risk of type 2 diabetes and cardiovascular disease that is independent of weight change. Consuming

large quantities of sugar or high-fructose corn syrup has been found to increase blood glucose and insulin.<sup>97</sup> Over time, the continued consumption of these sweeteners may lead to a high dietary glycemic load which is associated with C-reactive protein, a risk factor for type 2 diabetes and cardiovascular disease.<sup>98</sup> Additionally, fructose in both table sugar and high-fructose corn syrup may influence the body's fat storage and insulin mechanisms in a way that could increase disease risk.<sup>99</sup> Lastly, consumption of sugar-sweetened beverages is associated with dental carries.<sup>100</sup>

### *Consumption and weight gain*

Numerous research studies have observed an association between SSB consumption, weight gain, and risk of obesity-related disease. For example, Mozaffarian et al. (2011) examined the relationship between multiple behavioral factors including food and beverages consumption, physical activity, television viewing, and tobacco use in relation to weight gain in normal weight population cohorts.<sup>49</sup> The study population consisted of three separate cohorts assessed prospectively as part of other studies.<sup>49</sup> Across the three cohorts of more than 120,000 adults, comprised of both men and women in the US, the authors observed that SSB consumption was associated with a one pound increase in weight with each additional daily serving over a four year period, adjusting for potential confounders, such as physical activity and tobacco use.<sup>49</sup>

Woodward-Lopez et al. (2010) conducted a recent review exploring the association in adults and children between SSB consumption and a range of weight change outcomes including body mass index, and skin-fold thickness.<sup>88</sup> In total, of the 56 observational studies examined in the review, 16 longitudinal studies and 32 cross-

sectional studies found a positive relationship between SSB consumption and one of the weight outcomes.<sup>88</sup> The review also included four clinical trials which all observed positive associations between SSB intake, energy intake, and weight gain.<sup>101-104</sup> A trial by Tordoff and Alleva (1990) gave normal-weight participants 530 kcal of SSB each day for 3 weeks, or the equivalent of 3.5 cans of regular soda, and observed a 13% increase in total caloric intake and participant weight gain of 2.1 lbs in females and 1.1 lbs in males as compared to when the same subjects were given non-caloric beverages.<sup>101</sup>

In addition to Woodward-Lopez et al. (2010), seven systematic reviews have examined the relationship between SSB consumption and weight gain in adults and children with four of the studies including a meta-analysis. Three of the reviews, including two meta-analyses, found a positive association<sup>105-107</sup> while the remaining four did not draw conclusions based on the available data.<sup>108-111</sup> Two of the four reviews that did not find a positive association were industry funded.<sup>108,109</sup> One of these reviews, Forshee et al. (2008) included a meta-analysis that relied on a fixed-effects model instead of a random-effects model typically used for heterogeneous studies.<sup>108</sup> This analytic decision may have been flawed and influenced the findings, as highlighted by Malik et al. (2009).<sup>112</sup> The most recent review by Te Morenga et al. (2013) assessed the relationship between free sugars in food and beverages with body fatness.<sup>107</sup> Although SSB consumption was part of the exposure, this review and meta-analysis did not focus on SSBs and included naturally present sugars, as well as added sugars in the exposure definition. In summary, the literature continues to support the relationship between SSB consumption and energy intake, weight gain, and disease outcomes. Since the Te

Morenga et al. (2013) study was completed in December 2011, at least 3 studies exploring the relationship between SSB and weight gain have been published.<sup>49, 113, 114</sup>

### ***Policy Interventions for Obesity Prevention and Control***

Given the diversity in the factors contributing to obesity, researchers, policymakers, and practitioners have considered numerous strategies to address the epidemic. The approaches considered differ based on their intended level of impact – whether focused on the individual, community, or society. Interventions to prevent and control the epidemic in adults include community-based interventions emphasizing individual behavior change<sup>115</sup>, as well as population-level strategies, such as legislation, that are focused on structural changes to the built and natural environments.<sup>116-118</sup> In response to the current obesity epidemic and through a synthesis of the growing body of evidence, health authorities, including the Institute of Medicine (IOM) have issued numerous recommendations.<sup>119</sup> Recognizing the complexity of the obesity epidemic in the US and around the world, these agencies suggest a combination of policy and programmatic approaches that involve change at multiple levels – individual, family, community, and society.<sup>119</sup> The IOM’s 2012 Report, *Accelerating Progress in Obesity Prevention*, notes the importance of the relationship between individuals and the environment for combatting obesity.<sup>119</sup> The IOM, WHO, and others support an ecological approach to reduce population weight gain in adults and children.<sup>61,118,119</sup>

As part of an ecological approach, policy interventions are often used because they can complement existing community-based and individual-level obesity prevention efforts.<sup>38</sup> A policy intervention is defined in this study as a strategy that is accomplished



through laws, rules, or regulation changes and intends to affect health or health related behaviors. Organizations of any type may implement policy change; however, the types of policy intervention of primary interest in the current study are government initiated policies, such as legislation and regulation. Legislation and regulation are widely used in public health as an intervention strategy at the population level.<sup>120,121</sup> Some in the obesity prevention and control community support policy interventions based upon the progress achieved in reducing other behavioral risk factors for disease, such as tobacco use.<sup>119, 122,</sup><sup>123</sup> It is important to note that additional interventions to address adult weight gain and related obesity have been explored in individual, clinical settings<sup>124</sup>, as well as in community settings, such as building sports facilities and playgrounds.<sup>125</sup> However, a complete exploration of all individual and community level interventions is beyond the scope of this review.

Policy interventions targeting obesity and its contributing factors often include structural changes that modify the food and physical activity environments in ways that encourage behavior change, such as labeling of products and restaurant menus, as well as food price and tax modifications.<sup>119,126</sup> Several public health researchers and health organizations have conceptualized the health, economic, social, and environmental context in which obesity prevention policy could act to ultimately affect behavior change and health outcomes.<sup>118, 119, 127-129</sup> For example, Sacks et al. (2009), developed a broad framework based on WHO's Global Strategy on Diet, Physical Activity, and Health that is intended to capture and organize the numerous policy options for primarily government consideration.<sup>127</sup> Available approaches ranged from agricultural policy affecting the availability and price of specific foods to restrictions on unhealthy food marketing, and

land use management to encourage physical activity.<sup>127</sup> The Institute of Medicine recommends a range of policy and legislative options including limiting the availability of high-calorie, energy-dense foods in the school environment to improve diet, as well as, funding bike paths and parks to increase physical activity.<sup>119</sup> Strategies directed at sugar-sweetened beverage (SSB) consumption as a contributor to obesity and related disease outcomes have largely focused on limiting the availability of these products through restrictions imposed in specific environments, such as schools.<sup>126</sup> Beyond the school environment, policy options have included increasing taxes on SSBs, as well as healthy vending and procurement policies in government buildings and public parks.<sup>130, 131</sup> Another policy recently considered was a regulation in New York City to restrict the sale of SSBs over 16 ounces in size in a range of venues throughout the city, including restaurants, food carts, and convenience stores.<sup>132</sup>

As illustrated, there are a wide range of available policy approaches. In addition, the approach may vary based on its target audience and level of governance. The policy intervention may focus on a certain sector of the food system (e.g., retail), or a specific environment to capture a target audience (e.g., schools). Furthermore, the policy intervention may be initiated by federal, state, or local governments. For example, local governments in the US have the opportunity to implement menu labeling regulations that extend beyond a component of the federal Affordable Care Act that requires restaurants with 20 or more locations to list calorie information for consumers.<sup>133</sup>

### *Evidence on the effectiveness of policy interventions*

Despite the continued interest in policy interventions among some members of the obesity control community, the empirical foundation of such approaches in obesity prevention remains unclear.<sup>42, 134, 135</sup> Mozzaffarian et al. (2012) reviewed the evidence on policy approaches directed toward diet and physical activity and found that policies to reduce specific nutrients (e.g., trans fats) and subsidies to lower the price of healthy foods had a stronger evidence base than front-of-pack labels and taxes to increase the price of unhealthy foods and beverages.<sup>129</sup> However, many policy interventions, particularly those directed toward adults have a limited and inconsistent evidence base.<sup>119, 129</sup> One reason for the lack of these studies among adult populations is the scarcity of policies currently implemented or proposed in the US or elsewhere. Although simulation modeling studies have been completed to assess the impact of policies, such as SSB taxes on adults<sup>136</sup>, the current literature lacks longitudinal studies examining the impacts of policy interventions on adults, as well as on children.<sup>137</sup> One model was developed to assess expected beverage consumption change and tax revenue as a result of a national penny-per-ounce SSB tax in the US.<sup>136</sup> The model illustrated that the tax would potentially reduce the consumption of SSBs by 24%, reduce daily per capita caloric intake, and generate substantial revenue in excess of \$70 billion USD in five years.<sup>136</sup>

There is a larger body of literature that examines the impact of policy interventions among children as more policies have been implemented that target this population. In the past decade, the childhood obesity epidemic and related policy interventions have received tremendous attention in the gray<sup>119</sup> and peer-reviewed literature<sup>137, 138</sup> given the important public health need to prevent further exacerbation of

the epidemic. Cradock et al. (2011) observed that the removal of SSBs from schools was successful in reducing consumption of these beverages in the diets of Boston high school students.<sup>138</sup> However, the relationship between environmental characteristics and obesity that could serve as policy targets have not been consistently supported in the literature. For example, a recent study by Lee et al. (2012) did not observe a relationship between children residing in poor and minority neighborhoods and access to healthy food outlets, a relationship that had been previously supported.<sup>139</sup> Waters et al. (2011) conducted a systematic review of the current evidence regarding policy approaches addressing obesity in children.<sup>138</sup> One of the review's conclusions was that a focus on the environments in which children eat and play is an important target for intervention.<sup>138</sup> A similar review has not been conducted for adults due to the paucity of available evidence evaluating the few policy interventions implemented to date in an adult population.

While it is critical to continue focusing on the prevalence of obesity and related disease in children, it is also important to prevent the continued weight gain of adults with a normal body mass index, as well as to prevent further weight increase and related disease among overweight and obese adults.<sup>11-16</sup> In addition, it is essential to identify factors that influence weight gain among parents given their role in modeling behavior for children<sup>140</sup>, as well as their ability as caregivers to modify the family food environment in the home.<sup>141</sup> Poti and Popkin (2011) observed that a majority of the caloric intake among children (66%) takes place at home, and therefore, is primarily under parental control.<sup>142</sup> While children remain an important population of study, further consideration is warranted for interventions that reduce adult overweight and

obesity both for the health of the adult population, as well as the indirect role that adult weight gain plays on childhood obesity.

### ***Understanding the Policy Change Environment***

Several obesity-related policy interventions have been proposed in the US to date; however, a relatively small number of policies have been enacted and implemented outside of the school environment. The reason for the lack of policy implementation is likely multifaceted based on the history of policy development in other areas such as tobacco control<sup>143</sup> and injury prevention.<sup>144</sup> The development and implementation of policy interventions has been explored theoretically as a function of actors<sup>145</sup>, policy streams<sup>146</sup>, and an incremental processes.<sup>147</sup> A large evidence base in the political science, communication, and public health literatures has explored the policy process and the multiple contextual factors that influence it.<sup>148-150</sup>

Given the paucity of studies on the effectiveness of policy interventions and the literature's focus on children, an examination upstream in the obesity prevention and control policy process would be useful. More research is needed on the factors that promote and inhibit policy development and implementation, particularly policy interventions focused on an adult population. Understanding the context in which policy change occurs, including news media framing, public opinion, and characteristics of the policy process, is an important and understudied area in the field of obesity prevention and control.

## *Framing*

Message framing in the news media has been shown to play a role in policy development and implementation.<sup>151</sup> Framing involves “selecting some aspects of a perceived reality and make them more salient in a communicating text to promote a particular problem definition...or treatment recommendation” (pg. 52).<sup>152</sup> Stakeholders such as industry, special interest groups, public health organizations, and others contribute to messages in the period before a policy is enacted, as well as during implementation.<sup>145</sup> Additionally, the frame can reflect positions on an issue that are the product of journalist and editorial decision making and are not a precise measure of a stakeholder group’s perspective.<sup>153</sup> The resulting frames presented in the media have the potential to influence public and decision maker perceptions of the issue and potential solutions.<sup>154, 155</sup>

In addition to the way an issue is framed in news coverage, the volume of news media coverage can both hinder and promote the policy process as observed in tobacco and alcohol control.<sup>154, 156-161</sup> Harwood et al. (2005) explored media coverage of alcohol legislation in Louisiana and described a pattern in media attention regarding underage drinking and legislation.<sup>158</sup> The authors observed framing differences for individual-level compared to societal solutions and found that increased media attention when legislation was under consideration may have hindered policy progress.<sup>158</sup> Similarly, Harris et al. (2010) analyzed news coverage in Missouri prior to the 2006 statewide election in which a cigarette excise tax was going to be on the ballot.<sup>159</sup> The media’s focus on the economic impact of the tax was associated with lack of voter support and the tax was not successfully passed.<sup>159</sup> Champion and Chapman (2005), however, described a positive

relationship in Australia between enacting smoke-free legislation in bars and the amount of media coverage about health issues raised by public health advocates.<sup>160</sup> Furthermore, Asbridge (2004) observed a significant association between print media coverage and policy adoption of smoke-free indoor air policies in Canada.<sup>161</sup>

In studying how the news media presents obesity, Kim and Willis (2007) examined US print and television news between 1995 and 2004.<sup>162</sup> The authors found that the media mentioned personal causes of obesity and personal responsibility for obesity solutions as compared to societal causes and solutions.<sup>162</sup> However, over time, mentions of societal solutions increased.<sup>162</sup> Barry et al. (2011) studied framing of childhood obesity between 2000 and 2009 in national and regional news media outlets and also found that individual solutions (e.g., child or parent behavior change) were mentioned more often than societal options (e.g., legislative or regulatory change).<sup>163</sup> In consideration of the media's limited focus on societal solutions overall, others have examined media framing of specific policy interventions.<sup>161,164</sup> Niederdeppe et al. (2013) conducted a quantitative content analysis to explore the arguments in support and against SSB tax proposals in the US news media between 2009 and 2011.<sup>164</sup> The news coverage contained more pro- than con- tax arguments with local news outlets less likely to contain con-tax arguments than national outlets.<sup>164</sup>

The literature illustrates the potential importance of the amount of coverage and the way an issue is framed in the media, particularly prior to and during consideration and adoption of a policy intervention. In consideration of the literature on framing obesity prevention policies, no study to date has examined the news media framing of sugar-sweetened beverage portion size cap policies. Therefore, this study will examine framing

in news coverage of the regulation to restrict select SSBs over 16 ounces in size considered in New York City from 2012 to 2013 using a quantitative content analysis approach.

### *Public Opinion*

Public attitudes and beliefs regarding a proposed policy intervention can influence stakeholder decision making.<sup>165, 166</sup> Decisions to address a specific public health issue and the approach selected are shaped in part by public opinion that can inhibit or facilitate policy action.<sup>165, 166</sup> Surveys of public opinion continue to be used as a tool identifying which policies are selected for the legislative agenda<sup>167</sup> and for garnering policy support.<sup>168</sup> In obesity prevention and control, similar to studies of news media coverage, public opinion of obesity solutions often focus on individual behavior change as opposed to environmental changes such as public health policy.<sup>169, 170</sup> A survey that included US and Australian residents in 2012 over 18 years of age explored support for overeating as an addiction and examined how this would affect support for various policy options.<sup>170</sup> Although respondents viewed obesity as having addictive components, they saw the individual as responsible for losing excess weight. Furthermore, the authors found that 57% did not view taxing addictive foods or banning food advertising as effective solutions to address obesity.<sup>170</sup> Oliver and Lee (2005) conducted a survey in 2001 of the US adult population and found that 65% of respondents noted that an individual's lack of willpower was responsible for obesity.<sup>169</sup> The survey respondents also had low support for obesity policy interventions such as taxing snack foods relative to support for banning smoking in public places or requiring helmets for motorcyclists.<sup>169</sup>



The policies that received the most support were those focused on childhood obesity.<sup>169</sup> Tabak et al. (2013) examined support for various obesity prevention policies in 10 counties in Mississippi, including the 5 counties with the highest adult obesity prevalence and the 5 counties with the lowest prevalence.<sup>171</sup> Support was highest for policy approaches that addressed physical education requirements in school and support was lowest for soda taxes.<sup>171</sup>

In regard to the American public's opinion of a specific legislative option such as sugar-sweetened beverage taxes, a few studies in the peer-reviewed literature have explored public opinion of a tax with mixed findings.<sup>172-174</sup> A Pew Research Center Report polled Americans in October 2013 and found that only 35% of respondents favored a SSB tax.<sup>175</sup> Gollust et al. (2014) conducted a national opinion survey in 2012 and found that 22% of respondents supported SSB taxes.<sup>173</sup> In addition, Democrats, young adults (18 to 29 years), individuals with at least a college education and those who have a negative opinion toward the beverage industry had higher levels of support for a tax.<sup>173</sup> Rivard et al. (2012) studied consumption patterns, knowledge of SSB harms, and public support for a SSB tax across the US and found that 36% of adults support SSB taxes.<sup>174</sup> Young adults (18 to 25 years), those with at least some college, and non-obese individuals (BMI <30kg/m<sup>2</sup>) were more likely to support the tax.<sup>174</sup> In trying to understand the arguments that surround SSB tax debates in the US, Barry et al. (2013) conducted a national survey in 2011 and found greater levels of support for anti-tax compared to pro-tax arguments overall.<sup>172</sup> Among the anti-tax arguments, the most popular argument was that an SSB tax would not affect consumption of unhealthy foods, and therefore, was arbitrary.<sup>172</sup> In addition, a majority of respondents agreed with all but

one of the remaining anti-tax arguments examined.<sup>172</sup> In comparison, less than half of respondents agreed with any one pro-tax argument.<sup>172</sup>

The literature regarding SSB taxes and related arguments or messages used in policy debates have been assessed in national samples, with limited support. Given that support may differ at the state level, a study of the public attitudes toward a state SSB tax proposal is warranted. This dissertation includes an analysis of a public opinion survey on a state penny-per-ounce SSB tax, and illustrates how voters in one US state perceive a proposed tax and pro-tax messages.

### *Policy Process*

Policymakers operate in complex policy systems that include numerous factors affecting decision-making. Framing in the news media and public opinion can influence all points of the policy process, including policy consideration, enactment, implementation, and enforcement. This dissertation examines framing around the NYC Portion Size Cap from proposal through legal challenges to the policy and it explores public opinion of a proposed state SSB tax. In addition to the news media coverage and public opinion of obesity prevention policies, it is important to consider the content of the policy and other factors within the policy process that may affect policy enactment.

Boehmer and colleagues examined state legislation focused on childhood obesity from 2003 to 2005 and found that legislation focused on certain topics, such as farmers' markets, was more likely to be enacted compared to legislation about vending machines or physical education.<sup>176, 177</sup> In addition, state-level factors, including a 2-year legislative session and a Democratic majority in the state legislature, were associated with increased

childhood obesity legislation enactment.<sup>176</sup> A similar study examined childhood obesity legislation from 2006 to 2009 and found that safe routes to school legislation was more likely to be enacted than menu labeling or soda tax legislation targeting parent purchasing.<sup>178</sup> Legislation with bipartisan support or committee sponsorship was also more likely to be enacted.<sup>178</sup> Cawley and Liu (2008) explored additional state-level correlates of legislative action between 2003 and 2006, and found that states with a higher per capita income, a greater proportion of African Americans, a lower adult obesity rate, and those with a Democratic governor were more likely to enact laws focused on childhood obesity prevention.<sup>179</sup> Hersey et al. (2010) explored whether states that received CDC funding for obesity prevention programs had higher levels of obesity-related legislation enactment in 2005.<sup>180</sup> The authors included a broad range of legislation, affecting both children and adults, including legislation in community and school settings.<sup>180</sup> The study illustrated that states receiving funding enacted twice as many bills as those not receiving funding.<sup>180</sup> The authors suggest that states with funding were able to conduct activities such as developing state-specific obesity reports and holding forums of diverse stakeholders (e.g., business, healthcare, nonprofit sectors) that influenced key legislators.<sup>180</sup>

To date, two studies have explored obesity prevention legislation directed toward the US adult population using the same dataset of laws.<sup>181, 182</sup> Lankford et al. (2013) examined laws in four categories – taskforce, school, community, and health - that were enacted between 2001 and 2010 in 30 states.<sup>182</sup> The authors found that bills that created a taskforce or focused on the school environment were enacted most often.<sup>182</sup> Marlow (2014) explored 90 obesity prevention laws focused on adults and children from the same

database and found that states with a higher percentage of Hispanic and African American residents were more likely to enact obesity prevention legislation.<sup>181</sup> The previous studies that included adult legislation used only four categories to organize the bill content which may have been too broad to explore important nuances of bill topic characteristics. Furthermore the policy landscape may have changed since 2010. Therefore, more research is warranted to study current trends in the passage of adult obesity prevention legislation.

### ***Summary of Literature Review and Dissertation Rationale***

There is a rapidly growing literature on the prevention and control of obesity in children and adults that explores interventions at the community and individual levels. However, there is no consensus regarding what works in terms of policy strategies, including those focused on contributors such as SSB consumption.<sup>122</sup> In considering the literature in other areas, such as tobacco control, structural interventions in the form of policies and regulations have been associated with significant health benefits.<sup>47, 183</sup> For example, changes in smoking rates in the US over the past decades are largely credited to the tobacco control policy interventions that modified social norms through smoke-free indoor air restrictions, and altered environmental determinants such as reducing the availability of cigarettes with price increases.<sup>183</sup> While interventions attempting to address structural determinants, such as access to SSBs, may have an effect on weight as illustrated by simulation models<sup>184</sup> and in studies in children<sup>137</sup>, their impact on adult weight change is understudied.

Several gaps in the literature remain that could inform public health policy approaches to obesity prevention and control. First, the literature illustrates that message framing in the news media may influence decision maker perceptions; however, little is known regarding the messages used by stakeholders when policies directed at adult SSB consumption are proposed. Second, most US states have proposed or considered legislative tools focused on the prevention and control of obesity. However, public knowledge and attitudes toward the legislation is not well understood. Lastly, despite the burden of obesity in adults, relatively few legislative proposals have been signed into law. Further research is warranted regarding the factors that may influence legislative enactment on obesity prevention.

Given the interest in policy approaches, as well as the limited evidence regarding their impact among an adult population, the proposed research aims to fill gaps in the literature to inform current and future policies. While, a policy evaluation study is not yet possible given the paucity of policies focused on adults currently in place, this study was able to examine several aspects of the policy process including news media coverage, public opinion, and predictors of legislation enactment.

## **Dissertation Overview**

This study will inform policy interventions directed at sugar-sweetened beverage (SSB) consumption and other contributors to the obesity epidemic among US adults. The overall goal is to examine the policy process regarding interventions to reduce obesity and related health outcomes in the US adult population. In addressing the goal, this study will address three aims. Each aim attempts to fill an identified gap in the literature while

collectively adding to the current understanding of how to address SSB consumption and obesity in adults.

The research will inform current and planned approaches to addressing the obesity epidemic with contributions to the literature regarding the frames used in the news media during policy consideration (Aim 1), public knowledge, attitudes, and beliefs regarding a policy proposal (Aim 2), and the patterns and predictors of state legislative enactment (Aim 3).

The specific aims of this study are:

- **Aim 1:** To assess news media framing of New York City's (NYC) proposed regulation to prohibit the sale of sugar-sweetened beverages over sixteen ounces in size;
- **Aim 2:** To examine the characteristics of supporters and opponents of a state sugar-sweetened beverage (SSB) tax, and to identify pro-tax messages that resonate with the public; and
- **Aim 3:** To examine bill-level and state-level characteristics of adult obesity prevention legislation enactment in US states between 2010-2013.

### ***Organization of the dissertation***

Chapter 1 (current chapter) provides an overview of the obesity literature with a focus on sugar-sweetened beverages as an important contributor to the obesity epidemic. In addition, this chapter introduces the current literature on policy as a strategy to prevent and control obesity.

Chapter 2 describes the study's conceptual framework and the theories that guided the current research. This chapter also describes the study aims and the accompanying research methods.

Chapter 3 addresses Aim 1 through a quantitative content analysis of print and television news coverage of the proposed regulation to cap portion sizes on select sugar-sweetened beverages over sixteen ounces in size in New York City. This analysis explores the frames in support of and in opposition to the portion size cap policy.

Chapter 4 addresses Aim 2 through analyses of public opinion survey data among a representative sample of voters in one US state. The survey assessed support for a penny-per-ounce sugar-sweetened beverage (SSB) tax, support for SSB consumption reduction messages, and support for pro-SSB tax messages. This analysis examines the characteristics of supporters and opponents of an SSB tax and related SSB consumption and pro-tax messaging.

Chapter 5 addresses Aim 3 with an analysis of legislation enactment between 2010 and 2013 in the US. The chapter includes a description of patterns of adult obesity prevention bill introduction across US states. In addition, analyses examine the bill-level and state-level factors associated with legislation enactment using multi-level models.

Chapter 6 provides a summary of the study findings and describes the study's strengths and limitations. The chapter also provides recommendations for future research and the implications of the research for public health policy and practice.



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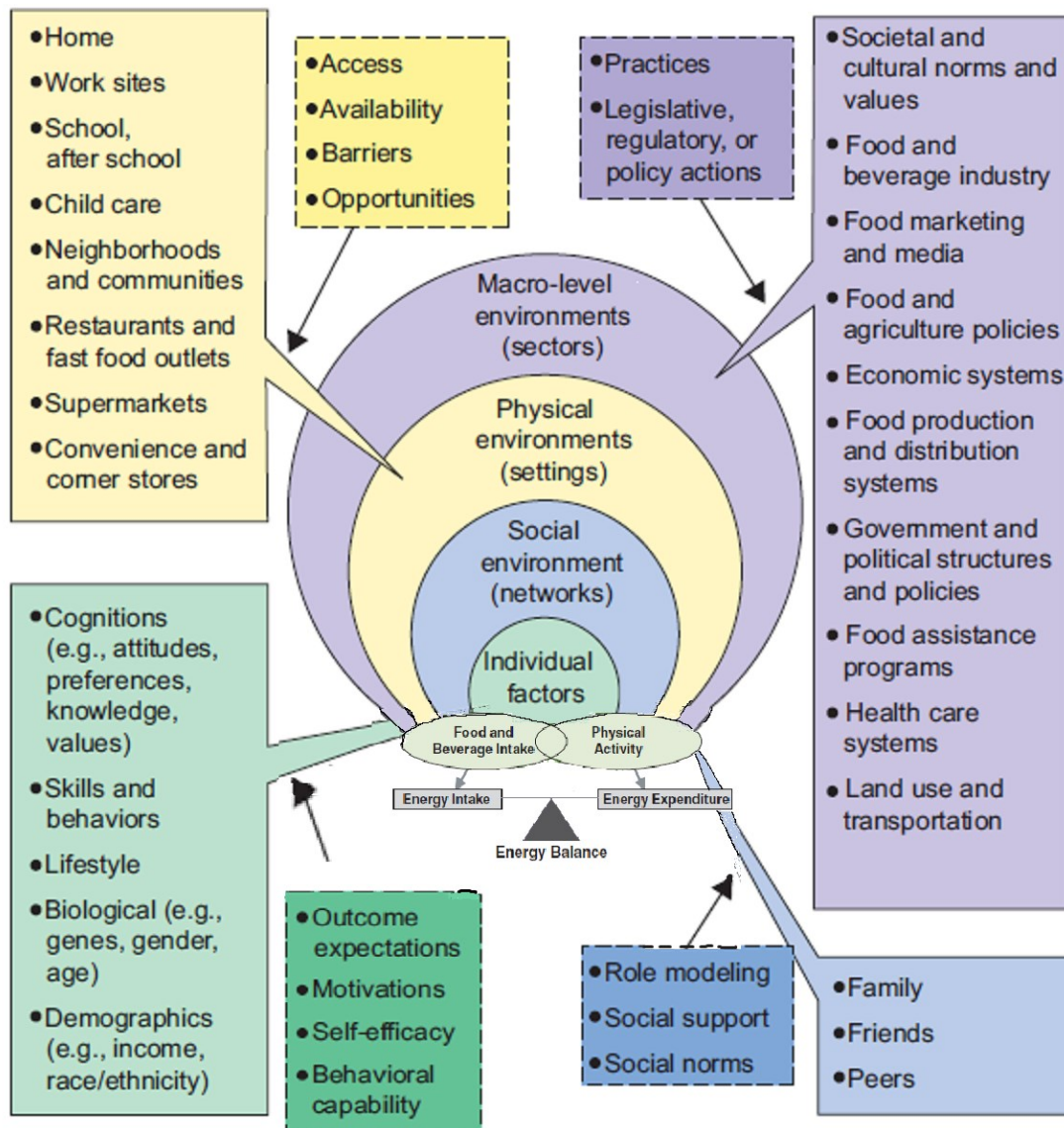
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## Tables and figures

**Figure 1-1. Ecological framework for contributors to the obesity epidemic [Adapted from Story et al. (2008) and IOM (2007)<sup>42,43</sup>]**



## **CHAPTER 2- STUDY AIMS AND METHODS**

## Conceptual Framework

The conceptual framework for this study is provided in **Figure 2-1**. The conceptual framework depicts the potential pathways between policy interventions directed toward obesity prevention and control among adults and subsequent weight change and other health outcomes. This study's framework broadly adopts the perspective of an ecological or systems-oriented approach such that SSB consumption and other obesity risk factors among adults and weight change are influenced by a combination of factors and feedback loops within the societal, community, and interpersonal environments.<sup>1,2</sup> This study acknowledges that the obesity epidemic results from a dynamic and multi-level system of influencing factors.<sup>2,3</sup> The current study identifies a structural intervention in the form of a policy as one potential modifier of consumption and resulting outcomes. The conceptual framework starts upstream by depicting factors influencing policy change and moves downstream in illustrating a policy's potential effect on individual adult SSB consumption and subsequent health outcomes. As illustrated in the conceptual framework, this research will include an exploration of several factors along the policy process pathway.

Several theories have explored the process of policy development and implementation including Kingdon's (1995) Policy Streams<sup>4</sup>, Jenkins-Smith & Sabatier's Advocacy Coalition Framework<sup>5-8</sup>, as well as the Incrementalism.<sup>9</sup> Kingdon's conceptualization of the policy process consists of a visible and hidden cluster that influence decision makers on the way to policy enactment.<sup>4</sup> The visible cluster includes the media and public opinion while the hidden cluster includes interest groups and other aspects of the administration.<sup>4</sup> In characterizing the policy process in a slightly different

way, the Advocacy Coalition Framework (ACF) suggests that policy change results from different sets of actors (coalitions) within policy subsystems.<sup>7</sup> The ACF is built around the following five assumptions: 1) scientific and technical information are important in the policy process; 2) at least 10 years or more are needed to understand policy change; 3) the policy subsystem is the primary unit of analysis for understanding the policy process; 4) the individuals within the policy subsystem can be government officials, as well as those outside of government; and 5) policy perspectives can be understood as a translation of beliefs.<sup>7</sup>

The conceptual framework guiding the current study's examination of the policy process was informed by the Advocacy Coalition Framework.<sup>5-8</sup> As illustrated in the framework (**Figure 2-1**), the policy process consists of subsystems, the primary focus of this study. Each of the three study aims will examine a component or external influence on the policy subsystem. A subsystem consists of government officials, journalists, and interest groups.<sup>7</sup> The groups can merge to form advocacy coalitions consisting of several or potentially hundreds of organizations and individuals within a policy subsystem. The coalitions form around a set of beliefs regarding the policy issue under consideration and develop a strategy to achieve their policy objectives. Furthermore, the actors working within the policy subsystems are influenced by internal and external events as the subsystems are part of the broader political and social environment. Sabatier and colleagues outline several paths to policy change both within and outside the policy subsystem.<sup>7,8</sup> One internal path is policy-oriented learning which is a change in policy objectives based on new information. This type of learning can affect secondary beliefs

which the ACF theorizes as more malleable than deep core beliefs. A second path to policy change is an external event such as changes in public opinion.

The current study will examine framing in the news media as it is a contributor to policy change through modifications of policy oriented learning and secondary beliefs (**Aim 1**). Furthermore, the findings may inform the work of existing coalitions by describing the opinion of the voting public - an external event that can influence the policy subsystem (**Aim 2**). Lastly, there are numerous factors at the policy level, such as institutional factors, external resources, and others that are theorized to influence the policy process in the ACF. This study will examine a subset of factors that affect the type of policy selected within the subsystem and its likelihood of passage in the state legislative environment (**Aim 3**).

Although the current study focuses upstream in the policy process, the framework in **Figure 2-1** illustrates the downstream effect of policy change as well. By downstream of the policy process, the framework illustrates the influence of policy interventions on individual behavior. A sugar-sweetened beverage policy intervention is provided for illustration and the pathway is informed by the current empirical evidence and plausible physiological mechanisms explaining the causal effect of consumption on health outcomes. The constructs and pathways depicted are important for understanding the effect of policy on health outcomes; however, examination of them is beyond the scope of this study.

**Aim 1: To assess news media framing of New York City’s (NYC) proposed regulation to prohibit the sale of sugar-sweetened beverages over sixteen ounces in size**

In examining news media coverage, many studies conduct a content analysis which can include a qualitative or quantitative approach.<sup>10, 11</sup> Content analyses offer a way to characterize features of the news media sources, including mention of specific words or frames, a thematic analysis of coverage, or an assessment of visual images.<sup>10, 11</sup> The current study uses a quantitative content approach to address the research questions below. Detailed methods are provided in **Chapter 3**.

***Research Questions and Hypotheses***

This study examined four research questions:

- (1) What policy frames emerge throughout consideration of the NYC portion size cap policy?

H1: Descriptive

- (2) Does the use of pro- and con- SSB policy frames differ by characteristics of the news outlet (i.e., television vs. print)?

H2: We hypothesized that there would be more television news stories with a con-policy frame compared to print story coverage.

(3) Does the framing of the portion size cap change before and after the Board of Health voted on the policy?

H3: We anticipated that this transition would correspond to shifts in the frames presented in the news coverage.

(4) What stakeholder groups supported and opposed the portion size cap?

H4: We expected that industry representatives would employ a greater proportion of con-SSB policy frames, whereas public health representatives and medical professionals would use more pro-SSB policy frames than other groups.

**Aim 2: To examine the characteristics of supporters and opponents of a state sugar-sweetened beverage (SSB) tax, and to identify pro-tax messages that resonate with the public**

Public opinion surveys are an approach used to ascertain the public's perspective on a political topic or proposed legislative or regulatory approach.<sup>11, 12</sup> Similar to other types of survey research, public opinion polls or surveys aim to gather information on a set of topics among a group of individuals based on a particular research question.<sup>11, 12</sup> However, public opinion surveys are often interested in a political issue such that the population of interest is often the voting public and the questions focus on an opinion or perspective on a certain issue (e.g., trans fat legislation).<sup>11, 12</sup> The current study analyzes public opinion survey data to address the research questions below. Detailed methods are provided in **Chapter 4**.

### ***Research Questions and Hypotheses***

This study addressed three research questions:

- (1) What are the characteristics of supporters and opponents of a state-level SSB tax?

H1: We hypothesized that individuals who believe SSBs are associated with obesity, believe that a SSB tax will be effective at reducing consumption, or are concerned with childhood obesity will be more likely to support the SSB tax and that Republicans and SSB consumers will be less likely to support the tax.

- (2) What are the characteristics of individuals persuaded and not persuaded by messages about reducing SSB consumption?

H2: We hypothesized that adults with higher education or those who believe SSBs are associated with obesity will be more likely to be persuaded by one or more of the SSB consumption messages.

- (3) What are the characteristics of supporters and opponents of pro-SSB tax messages?

H3: We hypothesized that adults with higher education or those who believe SSBs are associated with obesity will be more likely to support one or more of the pro-SSB tax messages.



**Aim 3: To examine bill-level and state-level characteristics of adult obesity prevention legislation enactment in US states between 2010-2013**

Prior studies have approached understanding predictors of legislation enactment from a methodological perspective that includes a review of publically available legislation databases and an analysis typically using multi-level modeling.<sup>13-15</sup> Multi-level models are often used to account for the structure of the data in which legislation information is clustered within states.<sup>15, 16</sup> In the current study, a thorough review of the complete contents of a publically available legislation database was conducted to identify adult obesity prevention legislation that met our inclusion criteria. A multi-level model was constructed to examine correlates of legislation enactment at both the bill and state levels. Detailed methods are provided in **Chapter 5**.

***Research Question and Hypotheses***

This study examined two research questions:

- (1) What are the patterns of obesity prevention legislation focused on adults?

H1: Descriptive

- (2) What are bill-level and state-level correlates of enactment in US states between 2010 and 2013?

H2: We hypothesized that the topic area of a bill would be associated with enactment. In addition, it was anticipated that state-level variables, such as the state having a single dominant political party (e.g. governor and state legislature

majority are Democrats) would be associated with enactment. Lastly, state-level obesity prevalence was expected to be inversely associated with enactment.

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## Tables and figures

**Figure 2-1. Conceptual framework of the relationship between obesity prevention policy interventions and morbidity and mortality among US adults.**



### **CHAPTER 3- NEWS MEDIA FRAMING OF NEW YORK CITY'S SUGAR-SWEETENED BEVERAGE PORTION SIZE CAP**

## **ABSTRACT**

**Objective:** To assess news media framing of New York City's (NYC) proposed regulation to prohibit the sale of sugar-sweetened beverages greater than sixteen ounces in size.

**Methods:** A quantitative content analysis was conducted of print and television news from NYC and non-NYC media markets. Support for and opposition to the portion size cap was examined in the news coverage from its May 31, 2012 proposal through the appellate court ruling on July 31, 2013.

**Results:** News coverage corresponded to key events in the policy's evolution. While a majority of stories mentioned obesity as a problem, a larger proportion used opposing frames (84%) than pro-policy frames (36%). Mention of pro-policy frames shifted toward the policy's effect on special populations. The debate's most prominent frame was the opposing frame that the policy was beyond the government's role (69%).

**Conclusions:** News coverage both within and outside the NYC media market was more likely to mention arguments in opposition than in support of the portion size cap. Understanding how the news media framed this issue provides important insights for advocates interested in advancing similar measures in other jurisdictions.

## INTRODUCTION

Sugar-sweetened beverages (SSBs) are considered a primary contributor to the obesity epidemic.<sup>1,2</sup> SSB consumption has increased concurrent with obesity and continues to represent a large source of added sugar in the US diet.<sup>1,2</sup> In response to rising consumption, US cities and states have considered various strategies – including legislation and regulation.<sup>3,4</sup> Strategies directed at SSB consumption have largely focused on limiting the availability of these products in specific environments (e.g., schools) or by imposing taxes on SSBs.<sup>5</sup> Another recent policy example is New York City (NYC)’s SSB portion size cap.<sup>6</sup>

In January 2012, the NYC Mayor’s Office convened a Task Force to develop obesity prevention and control strategies.<sup>6</sup> On May 31, 2012, the Task Force announced the SSB portion size cap, a proposed regulation that would amend the NYC Health Code to restrict the sale of portions greater than 16 ounces in size of select SSBs in restaurants, food carts, convenience stores, and movie theaters.<sup>7</sup> The regulation included non-alcoholic beverages with more than 25 calories per 8 ounces and those with less than 50 percent milk or milk substitute.<sup>7</sup> The NYC Board of Health adopted the regulation on September 13, 2012.<sup>8</sup> It was challenged by a lawsuit brought by organizations representing racial/ethnic minority groups, and labor and business associations in October 2012.<sup>9</sup> A New York state court forbade its enforcement on March 12, 2013, one day prior to its scheduled implementation.<sup>9</sup> An appellate court upheld the decision on July 30, 2013.<sup>10</sup> New York’s highest court heard the city’s final appeal and invalidated the policy on June 26, 2014.<sup>11</sup>



Consistent with the NYC portion size cap experience, jurisdictions throughout the US have faced difficulty implementing food and beverage policies. One factor that influences policy development and enactment is framing in the news media.<sup>12,13</sup> Framing involves “selecting some aspects of a perceived reality and making them more salient ... to promote a particular problem definition...or treatment recommendation” (pg. 52).<sup>14</sup> As illustrated in tobacco and alcohol control,<sup>15-20</sup> framing can be strategically used in political debates to influence the views of decision makers and the public.<sup>21</sup> The volume of news coverage and framing are important prior to and during consideration of a policy change.<sup>16-20, 22</sup> The amount of attention and the nature of how an issue is covered by the media have been shown to both hinder and promote policy enactment<sup>16-20</sup> with one study finding that lack of voter support for a tobacco tax was associated with news coverage.<sup>19</sup>

Framing in the news media can shape opinions of appropriate solutions for public health problems like obesity.<sup>13, 23</sup> However, little is known regarding the framing of policies directed at adult SSB consumption. Niederdeppe et al. (2013) explored the arguments surrounding SSB taxes in the news media and found that the news source was associated with the proportion of pro- versus anti-tax arguments, with local outlets less likely than national outlets to include anti-tax arguments.<sup>24</sup>

To date, no study has examined news coverage of an SSB portion size cap policy. To fill this gap, this study collected and analyzed news media coverage of NYC’s policy. Specifically, it examined how the news media described the portion size cap policy, the use of supportive and opposing frames, and whether use of these frames shifted over time. Finally, framing by different stakeholders was examined.

## **METHODS**

A quantitative content analysis was conducted to examine news media framing between May 31, 2012 and July 31, 2013 on the NYC restriction on the sale of SSBs greater than 16 ounces. Sources from the New York news media market included five regionally focused newspapers (*New York Times*, *New York Post*, *Wall Street Journal*, *New York Daily News*, and *Newsday*), and transcripts from evening news programs on four NYC broadcast networks (ABC, CBS, NBC, and Fox). News sources from outside the New York market included eighteen newspapers from across the US (*USA Today*, *Los Angeles Times*, *Washington Post*, *Chicago Tribune*, *Denver Post*, *Dallas Morning News*, *Houston Chronicle*, *Orange County Register*, *Newark Star-Ledger*, *Tampa Bay Times*, *Cleveland Plain Dealer*, *Philadelphia Inquirer*, *Minneapolis Star Tribune*, *Phoenix Republic*, *Honolulu Star-Advertiser*, *Atlanta Journal-Constitution*, *Las Vegas Review-Journal*, and *Boston Globe*) and transcripts from evening news programs on three national television networks (ABC, NBC, and CBS). Data from the Alliance for Audited Media were used to identify newspapers with the highest circulation rates.<sup>25</sup>

### **News Coverage Selection**

Print news and non-NYC television coverage were identified using LexisNexis, ProQuest, and Factiva databases. ShadowTV was used to collect NYC television transcripts.<sup>26</sup> Searches used the terms: “New York,” “New York City,” “soft drink,” “sugary beverage,” “soda,” “sugary drink,” “soda pop,” “sugar-sweetened beverage,” “ban,” “policy,” “regulation,” “restriction.” The search strategies are provided in **Appendix 3-1**.

The study period was chosen to reflect the issue's political evolution. Included news coverage began on May 31, 2012, the day that the proposal was announced.<sup>6</sup> A week look-back of news coverage was conducted to confirm that there was not prior coverage of the policy. Given that an appellate court upheld the decision to halt the policy's implementation on July 30, 2013,<sup>11</sup> the last date of publication for included stories was July 31, 2013.

After the database searches were complete, duplicate news stories were removed. Stories were included if their primary focus was the portion size cap (i.e., news stories were included if they discussed the NYC policy alone or if it was used as a primary example to discuss the government's role in public health). News stories were excluded if they discussed a similar policy in another jurisdiction (e.g., a portion size restriction in Cambridge, MA). News stories, editorials, syndicated and guest columns were included and classified according to story type including news, op-ed/editorial, sports, health, or lifestyle. Stories were excluded if they were less than 90 words in length or were letters to the editors, obituaries, or advertisements. Based on these exclusion criteria, 263 news stories were retained. A summary of the exclusion criteria by regional and national news source is provided in **Appendix 3-2**.

### **Content Analysis**

A 46-item coding instrument was developed to assess the presence or absence of supportive (pro) and opposing (con) portion size cap frames in the news coverage. Pro frames are arguments in support of the policy, such as it will reduce SSB consumption. Con frames are opposing arguments, such as it will unfairly hurt small businesses, with

any mention of the word fairness, equity, discrimination or related term coded in reference to the disproportionate economic impact. The frames contained in the coding instrument were identified through a qualitative review of a random sample of 15 articles within the NYC regional news outlets. The instrument was pilot tested by two coders (ED, PT) using a random sample of stories from news outlets not included in this study. Instrument wording was adjusted, a codebook was developed to clarify coding guidelines (e.g., example frames and definitions), and the instrument was further refined with pilot testing. The codebook is provided in **Appendix 3-3**. The instrument and data were managed in Qualtrics.<sup>40</sup>

Fifty-five percent of the 263 articles were double-coded (n=145) to produce inter-coder reliability statistics.<sup>27</sup> Item-specific raw agreement ranged from 80.7% to 100%. The kappa statistics ranged from 0.60 to 1.00 with an average kappa of 0.79. The authors considered a kappa statistic greater than 0.6 as having good agreement and greater than 0.8 as having excellent agreement.<sup>27</sup> The kappa statistic and raw agreement for each item are provided in **Appendix 3-4**.

## **Measures**

News content was coded across four domains. The first domain assessed obesity framing with four items. The second domain explored the policy's characteristics with six items. The third domain measured pro-policy frames with ten items and the fourth domain assessed con-policy frames with 26 items. The exact wording for all items is provided in **Appendix 3-4**.

## **Data Analysis**

The unit of analysis was the story. Descriptive statistics were calculated to examine whether news coverage differed in print versus television news, by the political leaning of print sources based on their 2012 presidential endorsement, and across key time periods in the policy debate controlling for story word count and adjusting standard errors for non-independence of news outlets.

## **Stakeholder Group Framing**

An 8-item instrument developed during the qualitative review of articles was used to identify the stakeholder group(s) that were quoted or paraphrased in the news coverage and to code their messages regarding the policy as pro, con, or neutral/balanced.

Stakeholder content was assessed by a single coder (ED). Stakeholders including both individuals and organizations were coded as one of the following: government officials, industry representatives, citizens or citizens' groups, academic researchers, public health representatives, and medical professionals. See **Appendix 3-5** for detailed information on these categories.

## **RESULTS**

**Table 3-1** summarizes the characteristics of the 263 news stories covering the portion size cap between May 28, 2012 and July 31, 2013. The majority of the stories were in print news (81%) and in local news sources (72%). **Figure 3-1** and **Appendix 3-6** indicate the volume of news coverage over the study period. As expected, news coverage was highest following the main events in the regulation's evolution.

### ***Framing the Problem of Obesity and Portion Size Cap Characteristics***

**Table 3-2** indicates that a majority of news stories framed the issue by mentioning that obesity is a problem (60.5%). Stories prior to the Board of Health vote were more likely to mention the role of the beverage industry as compared to stories after the vote (13.5% before vs. 5.4% after;  $p<0.05$ ). For example, stories mentioned that rising obesity is tied to industry supersizing. Stories published after the Board vote were more likely to mention that the policy did not cover all locations where sugary drinks are sold (44.6% after vs. 30.8% before;  $p<0.05$ ). Also, a greater proportion of stories after the vote mentioned that the aim of the policy was to improve health (57.7% after vs. 49.6% before;  $p<0.05$ ). For example, stories noted that the policy's intent was to combat obesity.

### ***Pro- and Con- Portion Size Cap Frames***

Overall, most stories (83.7%) contained at least one con-policy frame while about one-third (36.1%) included a pro-policy frame (**Table 3-3 and Appendix 3-7**). None of the pro-policy frames emerged as a key message in the coverage as between 2% and 23% of stories contained a specific pro-policy frame, such as the policy will reduce SSB consumption. In contrast, con frames about the role of government were included in 69% of stories. Thirty-nine percent of stories mentioned the policy infringed on free choice or consumer rights and 38% noted that the policy was a government "overreach." When the coverage was stratified by source, television stories were more likely than print to include at least one con-policy frame (90.2% vs. 82.1%;  $p<0.05$ ); however the proportion of

stories with at least one pro-policy frame was not significantly different (41.2% vs. 34.9%). There were no differences in the proportion of stories containing at least one pro-policy or con-policy frame in newspapers that endorsed the Democrat in the 2012 election as compared to Republican-endorsing papers (Pro: 37.1% vs. 35.4%; Con: 86.5% vs. 75.6%).

When comparing stories before and after the Board vote, the prevalence of pro- or con-policy frames overall was not significantly different. However, the proportion of stories with specific policy frames changed over time. Stories before the vote were more likely to contain a pro-policy frame suggesting that the policy would increase awareness of SSB harms compared to after the vote (12.0% before vs. 4.6% after;  $p<0.05$ ). In contrast, stories after the vote were more likely to emphasize the policy's benefits for specific populations, such as addressing the high SSB consumption rates in low income neighborhoods (12.3% after vs. 3.0% before;  $p<0.05$ ). Framing the portion size cap as a way to help children and adolescents increased from 2% before to 9% after the vote ( $p<0.05$ ).

With regard to con frames, stories after the vote were more likely to note that the policy would not affect health because it did not cover all beverages (16.2% after vs. 4.5% before;  $p<0.05$ ) or locations (23.1% after vs. 6.8% before;  $p<0.05$ ). Framing the policy as ineffective because SSBs are not a cause of obesity declined slightly over time (6.0% before vs. 1.5% after;  $p=0.05$ ). Con-policy frames about the policy's potential negative economic impact increased after the vote (23.9% after vs. 12.8% before;  $p<0.05$ ) as did mentions of the policy's negative impact on small businesses (16.9% after vs. 8.3% before;  $p<0.05$ ). Legal and implementation concerns were also raised more

frequently after the vote (48.5% after vs. 18.8% before;  $p<0.05$ ). Framing around the role of government remained high and did not significantly differ over time. A greater proportion of stories before the vote mentioned that the policy would limit free choice (45.9% before vs. 31.5% after;  $p<0.05$ ) or used the terms “nanny” or “nanny state” (30.1% before vs. 13.9% after;  $p<0.05$ ). In comparison, stories after the vote were more likely to note that the policy was beyond the government’s role (45.4% after vs. 30.1% before;  $p<0.05$ ). Lastly, 4% of stories before the vote mentioned a community or neighborhood program would be better than the policy compared to 2% after the vote ( $p<0.05$ ).

### ***Stakeholder Groups and Opinions***

Half of stories presented both pro-policy and con-policy stakeholder opinions (51%) with 28% providing only con-policy stakeholders and 21% only pro-policy. As **Figure 3-2** indicates, 75% of stories quoted or paraphrased government officials and 54% included industry representatives. Health interest groups and medical professionals were the least represented with 7% and 5% included in the coverage, respectively. A slight majority of the government and medical professionals were supportive of the policy, whereas industry representatives and citizens were largely opposed. Public health representatives (50%) and academic researchers (45%) had the largest proportion of quotes that were balanced or neutral.



## DISCUSSION

This study highlights the role of the news media in framing a highly politicized policy debate. The analysis found largely negative framing of the NYC SSB portion size cap in the news media with limited coverage of the policy's health benefits, framing that paralleled the ongoing legal challenge, and a primary focus on the government's role in public health.

In contrast to the only other news media content analysis focused on SSB policy,<sup>24</sup> the majority of portion size cap stories included con-policy frames and did not include a health benefit frame. Niederdeppe et al. (2013) found that coverage of SSB taxes included more pro- than anti-tax arguments with an overwhelming majority of national print and television stories containing a pro-tax argument.<sup>24</sup> Also, most stories provided a health argument supporting a tax while less than one quarter of stories in this study mentioned a health benefit of the portion size cap.<sup>24</sup> The increasing use of con-frames about the flaws in the portion size cap, as well as the limited number of pro-policy health and medical stakeholders may have weakened the pro-health frame over time. In contrast, industry stakeholders were prevalent in the news coverage and were unified in their opposition.

The portion size cap's introduction in NYC could have influenced the news coverage. For example, NYC has a history of considering and enacting novel public health policies<sup>28</sup> that may have affected the news coverage. It is also possible that because the policy had not been tried elsewhere, the lack of evidence about its potential effectiveness contributed to the limited pro-policy framing. An evidence base emerged

during policy consideration that included studies with mixed findings on the portion size cap's potential health effect.<sup>30-32</sup>

One reason that the news coverage of the portion size cap was so negative could be the ongoing legal challenge. The NYC Board of Health vote was selected as a key transition in the analysis based on the hypothesis that moving from consideration of the policy to facing its impending implementation and addressing ongoing legal challenges would alter framing. The findings indicate the framing shifted coincident with timing of the Board's vote and the filing of a lawsuit.

Con-policy frames focused more on economic, legal, and implementation concerns after the vote and the proportion of stories that mentioned the policy would impact small business owners, many of whom are minorities, doubled.<sup>37</sup> Furthermore, the policy was framed as flawed because it would not cover all locations where SSBs are sold. This framing may have reflected the position of minority groups and small business organizations in the lawsuit that argued they would face competition because large chains were exempt.<sup>9</sup>

In contrast to the negative frames regarding the policy's impact on small businesses, including minority owners, framing how the policy would benefit minority communities and low income neighborhoods was only included in 2% of stories. Therefore, despite the disproportionate impact of obesity on these communities, supporters of the policy were unable to successfully frame it as part of the solution for addressing obesity-related disparities. Furthermore, the involvement of minority groups with the beverage industry in the lawsuit against the policy was a significant challenge for policy proponents, and was reflected in news media framing. This dynamic was

reminiscent of the relationship between these groups and the tobacco industry in early tobacco control efforts.<sup>38</sup>

Another driver of the negative framing of the portion size cap in the news coverage was the inclusion of con frames about the role of government. The emphasis prior to the Board of Health vote was on restrictions in consumer choice, and on the Mayor imposing a “nanny state” which implied paternalism. Following the Board vote, the framing shifted to the notion that the policy was beyond the government’s role from a legal standpoint. This shift could be a reflection, in part, of the ongoing legal action that questioned whether the NYC Board of Health was the appropriate authority to enact this type of policy.<sup>9-11</sup>

As this study illustrated, the discourse around the use of policy approaches in public health often focuses on the contrast between individual freedoms and responsibilities, and protecting individuals from being harmed by themselves, other individuals, and the environment.<sup>33</sup> Similar to studies of other policy debates over SSBs and smoking,<sup>24, 34, 35</sup> the current findings suggest that news coverage of the policy was largely focused on the government’s intrusion on individual freedom as opposed to a government policy protecting health. Frequently quoted stakeholders were government representatives who supported the policy and industry representatives who opposed it. This reflected the rhetorical debate regarding the government’s role in protecting public health and perceived infringement on consumer freedom.

The observed framing shifts could have influenced the ongoing debate among policy elites and the public. As illustrated by tobacco tax studies, the nature of coverage and timing of frame changes are important for public support, as well as successful

passage.<sup>19,29</sup> Public support for the portion size cap may have been stronger if news coverage had framed a clear need to protect individuals from environmental harms, or harms imposed by individuals or groups.

### *Limitations*

This study has several limitations. Certain types of news coverage were excluded from the analysis including national cable news and news blogs, thereby limiting the generalizability of the findings with regard to these sources. Second, the ShadowTV database used to identify NYC television transcripts did not consistently attribute stakeholder quotations; therefore, those quotes (n=25) were unable to be coded. Third, the analysis of stakeholder perspectives should be considered exploratory to the extent that these items were coded by a single reviewer only; therefore, inter-rater reliability could not be empirically assessed. Fourth, the citizens' groups could have included industry funded groups, thereby influencing the perspectives of this category. Fifth, using a quantitative approach did not allow the study of frame components, such as exploring the use of metaphor.<sup>13</sup> Finally, this analysis used the news media to represent framing. The frames may reflect editorial views, stakeholder opinions, and societal values.<sup>34</sup> While news media may not be the most comprehensive source of data on framing, it offers a way to characterize what decision makers are exposed to when a policy is proposed and implemented.<sup>33,34</sup>

## *Conclusion*

This study analyzed the content of news media coverage of the NYC portion size cap debate from 2012 to 2013. While previous studies have explored the effect of the news media on policy enactment,<sup>16-20, 22</sup> this study focused on the debate surrounding the consideration, initial passage, and legal action that prevented a policy's implementation. Therefore, the current findings offer a unique exploration of framing during an ongoing policy debate and emphasize that the bulk of coverage was dedicated to con-policy frames. Future qualitative research should consider how coverage of the portion size cap may influence other policy actions in NYC and throughout the country.

The current analysis of a novel policy intervention may be useful to advocates in developing effective strategies for influencing the framing of future policy debates in news media coverage. The findings suggest that advocates should clearly and repeatedly emphasize the policy's health benefits. In addition, policy proponents should engage a range of stakeholders in the issue prior to developing media advocacy campaigns, particularly focusing on involving disadvantaged groups that may be impacted by the policy.<sup>39</sup> Lastly, the rationale for the policy approach and the historical role of local government in public health should be articulated early to counter opposing frames about the government's role. Overall, critically considering the role of news media framing in characterizing a policy debate and promoting or inhibiting policy action is critical when developing interventions to address the ongoing obesity epidemic.

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## Tables and figures

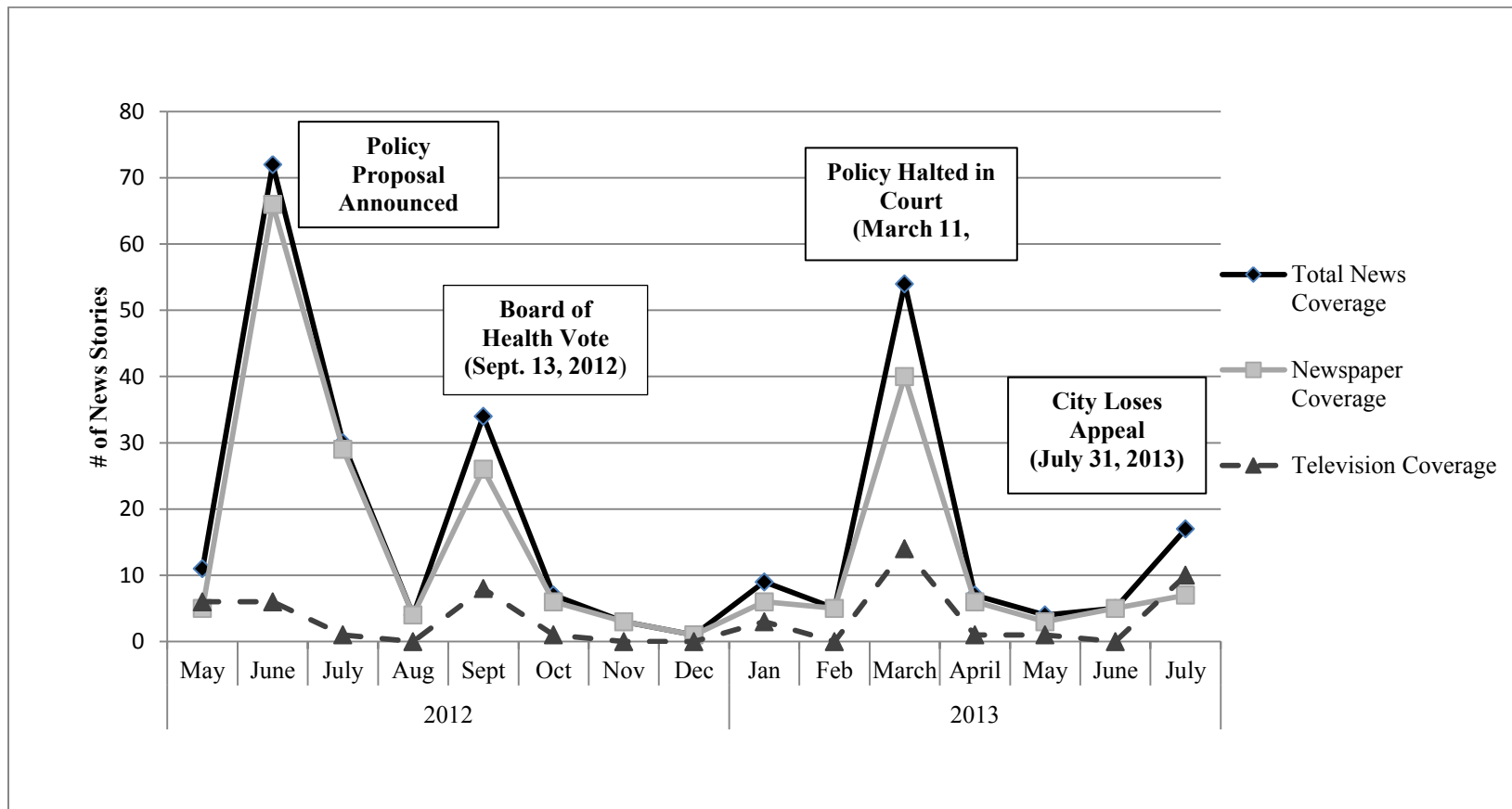
**TABLE 3-1. Descriptive Characteristics of News Coverage of the New York City Portion Size Cap Regulation, May 31, 2012 - July 31, 2013**

Characteristic	n (%)
Total news stories, n (%)	263 (100.0)
NYC news media market <sup>a</sup>	189 (71.9)
Non-NYC news media market <sup>b</sup>	74 (28.1)
Type of news stories, n (%)	
Print news stories	212 (80.6)
Television news stories	51 (19.4)
Newspaper story type, n (%)	
News section	151 (71.2)
Op-ed/editorial	49 (23.1)
Sports, health, lifestyle, or other section	12 (5.7)
Word count, (mean)	
Print news stories	611
Television news stories	356
Year, n (%)	
2012	162 (61.6)
2013	101 (38.4)
News story volume during key time periods in NYC Portion Size Cap debate, n (%)	
<i>Before Board of Health Vote</i>	
Portion cap proposed by NYC Dept. of Health on May 31, 2012 until the Board of Health vote on Sept. 13, 2012	133 (50.6)
<i>After Board of Health Vote</i>	
Following the Board vote through Oct. 11, 2012, when the beverage industry filed a petition in court challenging the portion size cap	19 (7.2)
Following the industry petition until the portion size cap implementation was halted by a New York state court on March 11, 2013	42 (15.9)
Following the portion cap court ruling until the City announced its plan to appeal the ruling on April 1, 2013	37 (14.1)
Following the City's appeal announcement until the City lost the appeal on July 31, 2013	32 (12.2)

<sup>a</sup> NYC news media market outlets included five daily newspapers that have a regional focus on NYC (*New York Times*, *New York Post*, *Wall Street Journal*, *New York Daily News*, and *Newsday*), and transcripts from evening news programs on four local NYC networks (ABC, CBS, NBC, Fox).

<sup>b</sup> Non-NYC news media market outlets included eighteen daily newspapers (*USA Today*, *Los Angeles Times*, *Washington Post*, *Chicago Tribune*, *Denver Post*, *Dallas Morning News*, *Houston Chronicle*, *Orange County Register*, *Newark Star-Ledger*, *Tampa Bay Times*, *Cleveland Plain Dealer*, *Philadelphia Inquirer*, *Minneapolis Star Tribune*, *Phoenix Republic*, *Honolulu Star-Advertiser*, *Atlanta Journal-Constitution*, *Las Vegas Review-Journal*, and *Boston Globe*), and transcripts of evening television news programs on three national networks (ABC, NBC, and CBS).

**FIGURE 3-1. News Coverage of the NYC SSB Portion Size Cap Regulation, May 31, 2012-July 31, 2013**



**TABLE 3-2. Proportion of News Coverage Framing the Problem of Obesity and the Characteristics of the NYC SSB Portion Size Cap Regulation, May 31, 2012-July 31, 2013**

Frame	Overall %	Before Board of Health Vote <i>(May 31, 2012 to Sept. 13, 2012)</i> %	After Board of Health Vote <i>(Sept. 14, 2012 to July 31, 2013)</i> %
	<b>n=263</b>	<b>n=133</b>	<b>n=130</b>
<b>News Stories Framing the Problem of Obesity</b>			
Mentions that obesity is a problem	60.5	60.9	60.0
Mentions that SSB consumption is a cause of obesity	27.4	31.6	23.1
Mentions the role of the industry in contributing to SSB consumption or obesity	9.5	13.5	5.4*
Mentions the role of individual choice, behavior, or lifestyles in contributing to SSB consumption or obesity	13.7	16.5	10.8
<b>News Stories Framing Characteristics of the SSB Portion Size Cap</b>			
Mentions that the aim of the policy is to improve health	53.6	49.6	57.7*
Mentions that the policy only includes certain types of beverages	28.9	24.8	33.1
Mentions that the policy only includes certain locations where SSBs are sold	37.6	30.8	44.6*
Mentions that individuals can purchase refills or more than one 16-oz beverage	28.1	33.8	22.3
Mentions that NYC Health Department has considered or enacted other obesity-specific public health interventions <sup>a</sup>	25.5	26.3	24.6
Mentions that NYC Health Department has considered or enacted other, non-obesity specific public health interventions <sup>b</sup>	22.4	23.3	21.5

<sup>a</sup> Other obesity-specific public health interventions include front of package labeling, menu labeling, trans-fat bans, and other food policies or programs.

<sup>b</sup> Non-obesity specific public health interventions include tobacco and alcohol policies and programs, such as smoke-free indoor air restrictions.

\* p-value <0.05 indicating frames in news stories that differ significantly across two time periods controlling for news story word count and adjusting standard errors for non-independence of news outlets.

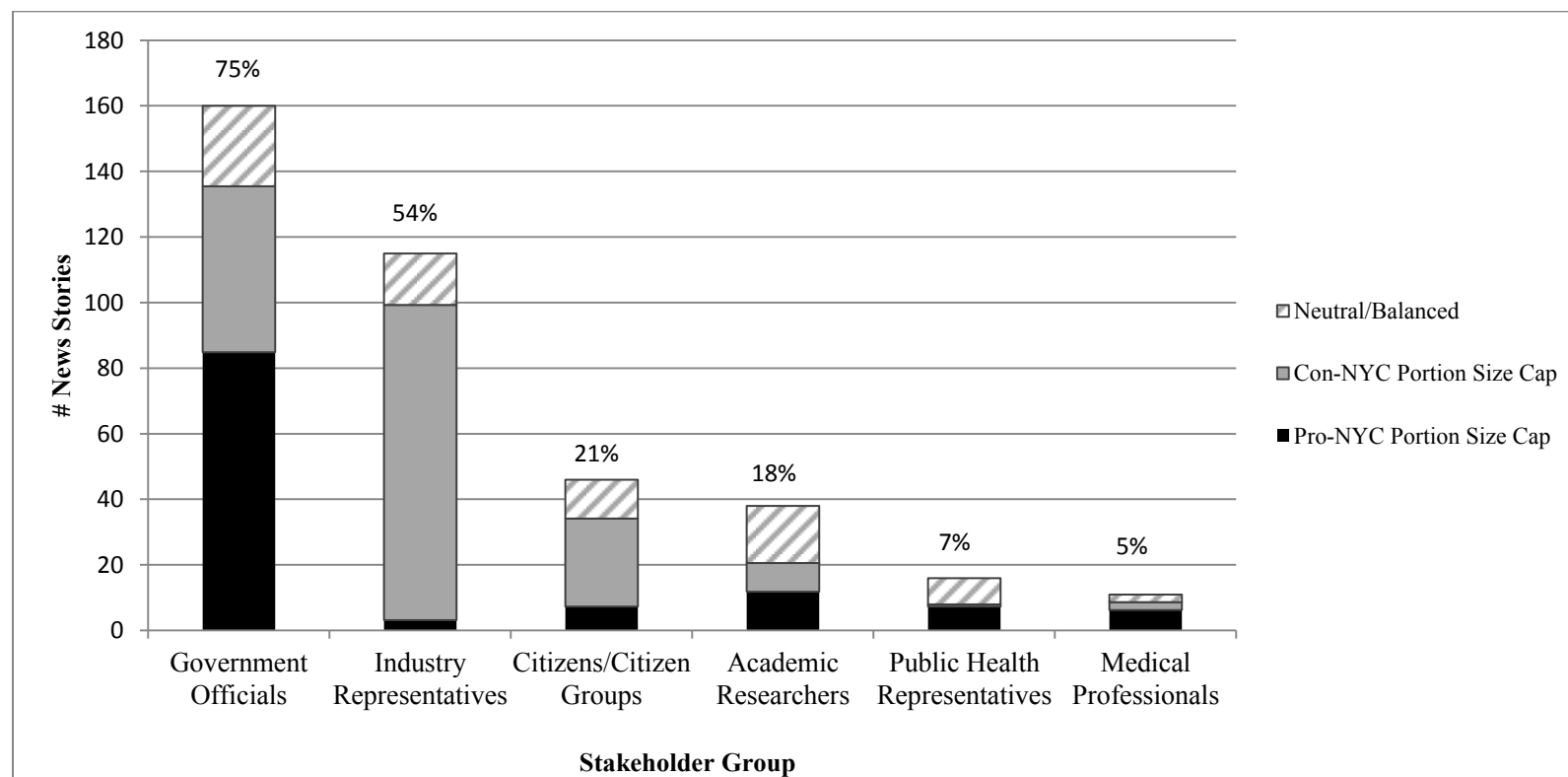
**TABLE 3-3. Proportion of News Coverage with Pro- and Con- Frames about the NYC SSB Portion Size Cap Regulation, May 31, 2012-July 31, 2013**

<b>Frame</b>	<b>Overall %</b>	<b>Before Board of Health Vote <i>(May 31, 2012 to Sept. 13, 2012)</i> %</b>	<b>After Board of Health Vote <i>(Sept. 14, 2012 to July 31, 2013)</i> %</b>
	<b>n=263</b>	<b>n=133</b>	<b>n=130</b>
<b>Pro-SSB Portion Size Cap Frames</b>			
Any Pro-SSB portion size cap frame	36.1	31.6	40.8
Mentions the portion size cap policy will have a positive health impact	23.2	24.8	21.5
Mentions the policy will increase awareness of SSB harms and obesity risk factors	8.4	12.0	4.6*
Mentions the policy will reduce the amount of SSBs consumed	7.2	10.5	3.9
Mentions the policy will decrease morbidity or mortality from obesity	11.0	6.8	15.4
Mentions the portion size cap policy will help special populations	7.6	3.0	12.3*
Mentions the policy could help children/adolescents	5.3	2.3	8.5*
Mentions the policy could help low income groups/neighborhoods	2.3	0.8	3.9
Mentions the policy could help racial/ethnic minorities	1.9	0.0	3.9
Mentions the portion size cap policy is part of the government's role or responsibility	13.7	10.5	16.9
<b>Con-SSB Portion Size Cap Frames</b>			
Any Con-SSB portion size cap frame	83.7	84.2	83.1
Mentions the portion size cap policy is flawed or will be ineffective	34.2	31.6	36.9
Mentions the policy is flawed because it does not cover all types of beverages	10.3	4.5	16.2*
Mentions the policy is flawed because it does not cover all locations where SSBs are sold	14.8	6.8	23.1*
Mentions the policy is flawed because individuals can purchase refills	9.9	11.3	8.5
Mentions the policy is flawed because it will not reduce obesity	9.9	12.0	7.8
Mentions the policy is flawed because SSBs do not cause obesity	3.8	6.0	1.5*

Mentions the portion size cap policy could hurt the local economy	18.3	12.8	23.9*
Mentions the policy will impact small businesses	12.6	8.3	16.9*
Mentions the portion size cap policy will hurt special populations	7.2	6.0	8.5
Mentions fairness or a related term	4.9	4.5	5.4
Mentions the portion size cap policy is not feasible	33.5	18.8	48.5*
Mentions the public does not like the policy	14.5	15.0	13.9
Mentions the policy is not feasible or will be difficult to enact or implement	6.1	2.3	10.0*
Mentions the policy is illegal, unconstitutional, or “arbitrary and capricious”	19.0	1.5	36.9*
Mentions the portion size cap policy is not part of the government’s role or responsibility	68.8	71.4	66.2
Mentions free choice, consumer rights, or protection of independence	38.8	45.9	31.5*
Mentions the policy is an overreach or beyond the government’s role or responsibilities	37.6	30.1	45.4*
Mentions “nanny” or “nanny state”	22.1	30.1	13.9*
Mentions the policy is a slippery slope	10.7	12.8	8.5
Mentions the portion size cap policy is not the best solution	14.4	16.5	12.3
Mentions a built environment change is a better solution	2.3	2.3	2.3
Mentions a school environment change is a better solution	4.2	6.0	2.3
Mentions neighborhood or community programs are a better solution	2.7	3.8	1.5*
Mentions mass media or education campaigns are a better solution	6.8	7.5	6.2
Mentions legislation or regulation is a better solution	5.3	6.0	4.6

\* p-value <0.05 indicating frames in news stories that differ significantly across two time periods controlling for news story word count and adjusting standard errors for non-independence of news outlets.

**FIGURE 3-2. News Coverage with Pro- and Con- Stakeholder Quotes about the NYC SSB Portion Size Cap Policy, May 31, 2012-July 31, 2013**



*Note.* Stakeholder group descriptions are provided in Appendix 3-6.



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### **Appendix 3-1. Content Analysis Search Strategy**

I used the following strategy to search LexisNexis:

BODY (New York) AND BODY(soft drink) OR BODY(sugary beverage) OR BODY(soda) OR BODY(sugary drink) OR BODY(sugar sweetened beverage) OR BODY(sugar) AND BODY(ban) OR BODY(policy) OR BODY(regulation) OR BODY(restriction) OR BODY (cap)

I used the following strategy to search Factiva:

(soft drink OR sugary beverage OR soda OR sugary drink OR sugar sweetened beverage OR sugar) AND (policy or regulation or restriction or ban or cap)

I used the following search strategy to search ProQuest Central:

ft(New York) AND ft(soft drink OR sugary beverage OR soda OR sugary drink OR sugar sweetened beverage) AND ft(ban OR cap OR policy OR restriction) AND pub(chicago tribune)

I used the following strategy to search ShadowTV:

("soft drink\*" OR "sugary beverage\*" OR "soda" OR "sugary drink\*" OR "sugar sweetened beverage\*" OR "sugar\*") AND ("policy" OR "policies" OR "regulation\*" OR "restriction\*" OR "ban")

**Appendix 3-2. Exclusion Rate by National and Regional News Media Source**

<b>Name</b>	<b>Articles Retrieved</b>	<b>Articles Retained</b>	<b>Exclusion Rate</b>
National Print	346	60	0.83
National Television	277	14	0.95
Regional Print	595	152	0.74
Regional Television	63	37	0.41
<b>TOTAL</b>	<b>1281</b>	<b>263</b>	<b>0.73</b>

### Appendix 3-3. Codebook

#### **PART IA: General Information – Exclusion**

Item	Item Description	Coding Scheme			Variable Name
<b>Coder #</b>	Individual who is reviewing the document and entering data on these items	1= ED 2=PT			CC
<b>ID Number of Document</b>	The unique identification number of the document.	Three Digit Article ID			ID
<b>Media Outlet</b>	Name of the publication or media outlet where document was published	1 =New York Times 2= New York Post 3= Wall Street Journal 4=New York Daily News 5= ABC Local Evening News 6 = CBS Local Evening News 7 = NBC Local Evening News 8= Fox Local Evening News 9= USA Today 10= Los Angeles Times	11= Washington Post 12=Chicago Tribune 13 = Denver Post 14= Dallas Morning News 15 = Newsday 16= Houston Chronicle 17= Orange County Register 18= Newark Star-Ledger 19= Tampa Bay Times 20 = Cleveland Plain Dealer	21= Philadelphia Inquirer 22= Minneapolis Star Tribune 23=Phoenix Republic 24= Honolulu Star-Advertiser 25= Atlanta Journal-Constitution 26 = Las Vegas Review-Journal 27= Boston Globe 28= ABC National Evening News 29= CBS National Evening News 30= NBC National Evening News	SOURCE
<b>Exclusion 1</b>	<p>The print article must be primarily (1 or more paragraphs or approximately 50% of the article) about the New York City Restriction on Sugary Drinks, restricting beverages over 16 ounces in size NYC (Amendment of Article 81 of the NYC Health Code). The article may focus on the ban as a means to discuss its relevance to broader discussions of the role of public health, or its coverage in popular media. If the article meets the 2 or more paragraph criteria and is about the ban as an impetus for the broader discussion or the underlying main point, the article should be included.</p> <p>TV news coverage must include mention of the New York City Restriction on Sugary Drinks (Amendment of Article 81 of the NYC Health Code). It must be a major theme of the transcript such that at least four sentences of the transcript are dedicated to</p>			0= yes 1=no	E1

	discussing the policy.		
<b>Exclusion 2</b>	<p>Read the article to determine if it meets one of the category exclusions.</p> <ul style="list-style-type: none"> <li>• Duplicate category is defined as a news article or story that is the same article published in more than one edition of the newspaper on the same day, for example, published in the national and regional edition.</li> <li>• Index category is a teaser about a news article found somewhere else in the newspaper.</li> </ul> <p>Similarly, Intro/lead in category is the analogous type of article for television news with the transcript text indicating a lead in for a story “coming up next” or “later in our broadcast.”</p>	<p>0=news article/op-ed/editorial  1=book review  2=duplicate  3=calendar or event report  4 = introduction/lead in only  5 = index only  6= correction</p>	E2
<b>Exclusion 3</b>	<p>Word Length</p> <p>0 = article &gt;90 words  1= article &lt;90 words</p>		E3

Exclude articles/stories based on one exclusion criteria (E1 to E3). Exclude articles in order as listed above. If an article/story meets at least one of the exclusion criteria above, do not continue filling out the remainder of the form.

### **PART IB: General Information – Continue with Included Documents**

<b>Item</b>	<b>Coding Scheme</b>	<b>Variable Name</b>
Word Count of the article	Story word count provided in article database (e.g. Lexis Nexis, Factiva). If the story is a part of a larger article or document (e.g. television transcripts), use the word count function in Microsoft Word to count.	WC
Month article was published (two #)	Provide the month that the article was published in two number format.	MONTH
Day article was published (two #)	Provide the day that the article was published in two number format.	DAY
Year article was published (four #)	Provide the year that the article was published in a four number format.	YEAR
<p>Section type (newspapers only)</p> <ul style="list-style-type: none"> <li>• Code the section for newspapers only. Do not code for television transcripts. Identify the section using the criteria on the right. In Lexis Nexis, you can use the “Section” category. In Factiva, the section category is inconsistent.</li> </ul>	<p>1 = news (Section A)</p> <ul style="list-style-type: none"> <li>• These are news stories that are in the A section (e.g. page A5, or any A page other than A1). In addition, these are stories that have a news focus rather than a section focus listed in the other section categories below.</li> </ul> <p>2 = op-ed/editorial</p> <ul style="list-style-type: none"> <li>• The article must state in the heading information that the story is an opinion</li> </ul>	SECTION

	column or editorial.	
	3= Other <ul style="list-style-type: none"> <li>Any other sections, including sports that are not noted in the category options above.</li> </ul>	
	4 = NA <ul style="list-style-type: none"> <li>Use this code for television transcripts.</li> </ul>	

## **PART II: Frames**

<b>Item</b>	<b>Item Explanation</b>	<b>Coding Scheme</b>	<b>Variable Name</b>
<b>News Stories Framing the Problem of Obesity</b>			
Mentions that obesity is a problem	Mentions that <u>obesity</u> is a problem.  Ex: Obesity is a major public health problem; Obesity Epidemic; More than 1/2 of New Yorkers are overweight or obese.	2=no;1=yes	Q1
Mentions that SSB consumption is a cause of obesity	Mentions that SSB consumption is a cause of obesity.  Ex: Excess consumption of soda leads to weight gain or obesity; SSB consumption is linked to obesity.	2=no;1=yes	Q2
Mentions the role of the industry in contributing to SSB consumption or obesity	Mentions the role of industry in SSB consumption or obesity.  Ex: The cheap price of sugary drinks has contributed to high consumption rate; SSB consumption is a consequence of beverage industry advertising; Obesity rates are tied to industry supersizing.	2=no;1=yes	Q3
Mentions the role of individual choice, behavior, or lifestyles in contributing to SSB consumption or obesity	Mentions the role of individual choice, behavior, or lifestyles in the obesity or SSB problem.  Ex: New Yorkers choosing supersized portions of beverages are to blame; Children lead a sedentary lifestyle; people don't make good dietary choices; Obesity is a personal health problem.	2=no;1=yes	Q4

<b>News Stories Framing Characteristics of the SSB Portion Size Cap</b>			
Mentions that the aim of the policy is to improve health	<p>Mentions the policy's intent regarding health.</p> <p>Ex: The policy's intent is to combat rising obesity. The mayor proposed the policy to help fight sugary drinks. The purpose of the policy is to combat obesity. Most people are wringing their hands over it, but we are doing something about it. The ban is part of the mayor's drive to address the obesity epidemic.</p>	2=no;1=yes	Q5
Mentions that the policy only includes certain types of beverages	<p>Mentions that policy only includes certain types (does not cover all types) of beverages.</p> <p>Ex: The policy does not include products with less than 50% milk; The policy is limited to beverages that don't have nutritional value like sodas as milk-based products are exempt.</p>	2=no;1=yes	Q6
Mentions that the policy only includes certain locations where SSBs are sold	<p>Mentions that policy only include some locations (does not cover all locations) where SSBs are sold.</p> <p>Ex: The policy does not include 7-11s or grocery stores.</p>	2=no;1=yes	Q7
Mentions that individuals can purchase refills or more than one 16-oz beverage	<p>Mentions that individuals can purchase refills or more than one 16-oz beverage at a time.</p> <p>Ex: The ban allows individuals to buy more than one drink at a time; Individuals will have the choice to buy a refill under the policy.</p>	2=no;1=yes	Q8
Mentions that NYC Health Department has considered or enacted other obesity-specific public health interventions	<p>Diet or Physical Activity Intervention</p> <p>Ex: NYC Department of Health has acted on previous</p>	2=no;1=yes	Q9

	occasions to make New Yorker's healthier, including a ban on trans fats. Policies or programs could include - Front of package labeling, menu labeling, trans fat ban, other food policy or program).		
Mentions that NYC Health Department has considered or enacted other, non-obesity specific public health interventions	Other Intervention  Ex: The policy will have a similar impact or is akin to smoke-free indoor air policies. Policies or programs could include - tobacco or alcohol policy or program.	2=no;1=yes	Q10
<b>Pro-SSB Portion Size Cap Frames</b>			
Any Pro-SSB portion size cap frame	Mentions any pro-policy arguments including (but not limited to) that the SSB size cap policy will be beneficial or effective.  Please NOTE that this item is inclusive of those below it in the Pro-SSB Portion Size Cap Section. However, it is discrete from Q5 regarding the intent of the policy. Therefore, be careful that for this section the argument(s) meet one of the criteria below AND is different from Q5. One way to think about how Q5 and Q11 are discrete is to consider the person delivering the statement, as well as its contents. For example, Q5 = the Mayor's office proposed this policy to help with obesity. For example, Q11= a health expert noted that this ban will reduce or effect obesity in the city.	2=no;1=yes	Q11
Mentions the portion size cap policy will have a positive health impact	Mentions that the policy will be beneficial or effective.	2=no;1=yes	Q12
Mentions the policy will increase awareness of SSB harms and obesity risk factors	Ex: The NYC Policy will educate consumers and raise awareness of the harms of these beverages; The NYC policy would educate consumers about eating healthy; The NYC Policy would tell people what they are doing to themselves; The policy will force people to understand how much they are consuming; It will help people think about what they are drinking.	2=no;1=yes; 3=NA	Q12a
Mentions the policy will reduce the amount of SSBs consumed	The NYC Policy would have an effect on high SSB drinking rates; The policy will reduce the size of sugary drinks	2=no;1=yes; 3=NA	Q12b



	available; People will drink less because of this policy; People will consume less sugar due to the policy.		
Mentions the policy will decrease morbidity or mortality from obesity	Ex: The policy will reduce rates of diabetes, heart disease, or cancer among New Yorkers; The SSB Ban will be good for the health of New Yorkers; The ban should save lives.	2=no;1=yes; 3=NA	Q12c
Mentions the portion size cap policy will help special populations	Argues in favor of SSB size cap policy because it could help a special population (e.g. children or adolescents, low income groups, racial/ethnic minorities).	2=no;1=yes	Q13
Mentions the policy could help children/adolescents	Ex: Kids and teens in NYC drink too much soda and will be most affected by the policy.	2=no;1=yes; 3=NA	Q13a
Mentions the policy could help low income groups/neighborhoods	Ex: Residents of the low-income groups or neighborhoods (e.g. Bronx and Harlem) consume high amounts of soda and this will help those communities most.	2=no;1=yes; 3=NA	Q13b
Mentions the policy could help racial/ethnic minorities	Ex: Mexican Americans are unfairly targeted by the beverage industry and this policy will counteract that action.	2=no;1=yes; 3=NA	Q13c
Mentions the portion size cap policy is part of the government's role or responsibility	Argues in favor of SSB size cap policy because it is part of the local government's role or responsibility  Ex: Local governments often act to protect the health of its citizens; It is legal for the NYC Health Department to enact this policy. The NYC Department of health has acted before to protect the public and this ban is within its purview.	2=no;1=yes	Q14
<b>Con-SSB Portion Size Cap Frames</b>			
Any Con-SSB portion size cap frame	Mentions any con-policy arguments including (but not limited to) that the SSB policy is flawed or will be ineffective.	2=no;1=yes	Q15
Mentions the portion size cap policy is flawed or will be ineffective	Mentions that the policy is flawed or will be ineffective.	2=no;1=yes	Q16
Mentions the policy is flawed because it does not cover all types of beverages	Ex: The policy is ineffective because does not cover all types of SSBs (e.g. soy-based, >50% milk-based products).	2=no;1=yes; 3=NA	Q16a

Mentions the policy is flawed because it does not cover all locations where SSBs are sold	Ex: The policy will not work because does not cover all locations where SSBs are sold (e.g. grocery stores, 7-11 convenience stores).	2=no;1=yes; 3=NA	Q16b
Mentions the policy is flawed because individuals can purchase refills	Ex: Individuals can purchase refills or more than one 16-oz beverage at a time; and therefore, consumption won't decrease.	2=no;1=yes; 3=NA	Q16c
Mentions the policy is flawed because it will not reduce obesity	Ex: The policy will not have an effect on obesity.	2=no;1=yes; 3=NA	Q16d
Mentions the policy is flawed because SSBs do not cause obesity	Ex: The policy isn't going to work because SSBs aren't driving the epidemic.	2=no;1=yes; 3=NA	Q16e
Mentions the portion size cap policy could hurt the local economy	Argues in opposition to SSB size cap policy because it could hurt the local economy  Ex: A loss of jobs, economic burden on restaurant, movie theater, food cart, corner store (bodega), or other retailers, distributors, or producers.	2=no;1=yes	Q17
Mentions the policy will impact small businesses	Ex: The policy is bad for local business; The policy is unfair for small businesses.	2=no;1=yes; 3=NA	Q17a
Mentions the portion size cap policy will hurt special populations	Any Con-Policy Special Population Argument - Argues in opposition to SSB size cap policy because it could hurt a special population (e.g. children or adolescents, low income groups, racial/ethnic minorities).	2=no;1=yes	Q18
Mentions fairness or a related term	Ex: It will stigmatize overweight kids; Any mention of the words fairness, equity, social justice, discrimination, human rights, or classism in relation to racial/ethnic minorities and SSB policy's negative impact.	2=no;1=yes; 3=NA	Q18a
Mentions the portion size cap policy is not feasible	Mentions any con-feasibility argument including but not limited to those below.	2=no;1=yes	Q19
Mentions the public does not like the policy	Argues in opposition to SSB size cap policy by noting low	2=no;1=yes;	Q19a

	<p>public support for the policy.</p> <p>Ex: There is low public support for the policy; NYC residents are not supportive of this policy based on results of public opinion poll; People don't like this policy. The policy is unpopular.</p>	3=NA	
Mentions the policy is not feasible or will be difficult to enact or implement	<p>Argues in opposition to SSB size cap policy by noting that it is not feasible or difficult for the Department of Health to enact or implement.</p> <p>Ex: It will not be possible for small business owners to change the size of all of their cups and containers; The policy will never get through the appellate court. Business owners are confused or will not be able to achieve the necessary changes for implementation.</p>	2=no;1=yes; 3=NA	Q19b
Mentions the policy is illegal, unconstitutional, or “arbitrary and capricious”	Mentions that the court system struck it down or called the SSB size cap policy illegal or unconstitutional, “arbitrary and capricious.”	2=no;1=yes; 3=NA	Q19c
Mentions the portion size cap policy is not part of the government’s role or responsibility	Argues in opposition to SSB size cap policy related to the role of government.	2=no;1=yes	Q20
Mentions free choice, consumer rights, or protection of independence	<p>Ex: Any mention of the words free choice, consumer rights, protection of children/family, independence, moral issue. Note - this could be broader than just the words mentioned here.</p>	2=no;1=yes; 3=NA	Q20a
Mentions the policy is an overreach or beyond the government’s role or responsibilities	<p>Ex: The NYC Department of health is overstepping, out of line, going too far, out of bounds, beyond its authority in enacting and implementing this policy. Note - could code 22 and 23 if the court language talked about the Health Department going beyond its executive power.</p>	2=no;1=yes; 3=NA	Q20b
Mentions “nanny” or “nanny state”	<p>Ex: This policy is a typical nanny state action that is taking away our freedom to choose a beverage.</p>	2=no;1=yes; 3=NA	Q20c

Mentions the policy is a slippery slope	Ex: After this policy, what is next, a ban on cheeseburgers?	2=no;1=yes; 3=NA	Q20d
Mentions the portion size cap policy is not the best solution	Argues in opposition to SSB size cap policy because other solutions would be better.  Ex: The SSB policy is not as viable/effective a solution to obesity as X alternative.	2=no;1=yes	Q21
Mentions a built environment change is a better solution	Ex: parks and playgrounds, bike programs, improve access to healthy foods.	2=no;1=yes; 3=NA	Q21a
Mentions a school environment change is a better solution	Ex: removal of vending machines, school lunch contents, school physical activity programs.	2=no;1=yes; 3=NA	Q21b
Mentions neighborhood or community programs are a better solution	Ex: parks and playgrounds, bike programs, physical activity programs (e.g. gym memberships), neighborhood food carts.	2=no;1=yes; 3=NA	Q21c
Mentions mass media or education campaigns are a better solution	Ex: media campaigns.	2=no;1=yes; 3=NA	Q21d
Mentions legislation or regulation is a better solution	Ex: Government policy or regulatory measure such as restricting other foods or beverages, taxation, health warnings on packages, etc.	2=no;1=yes; 3=NA	Q21e

### Appendix 3-4. Item-Specific Agreement and Inter-Coder Reliability Statistics

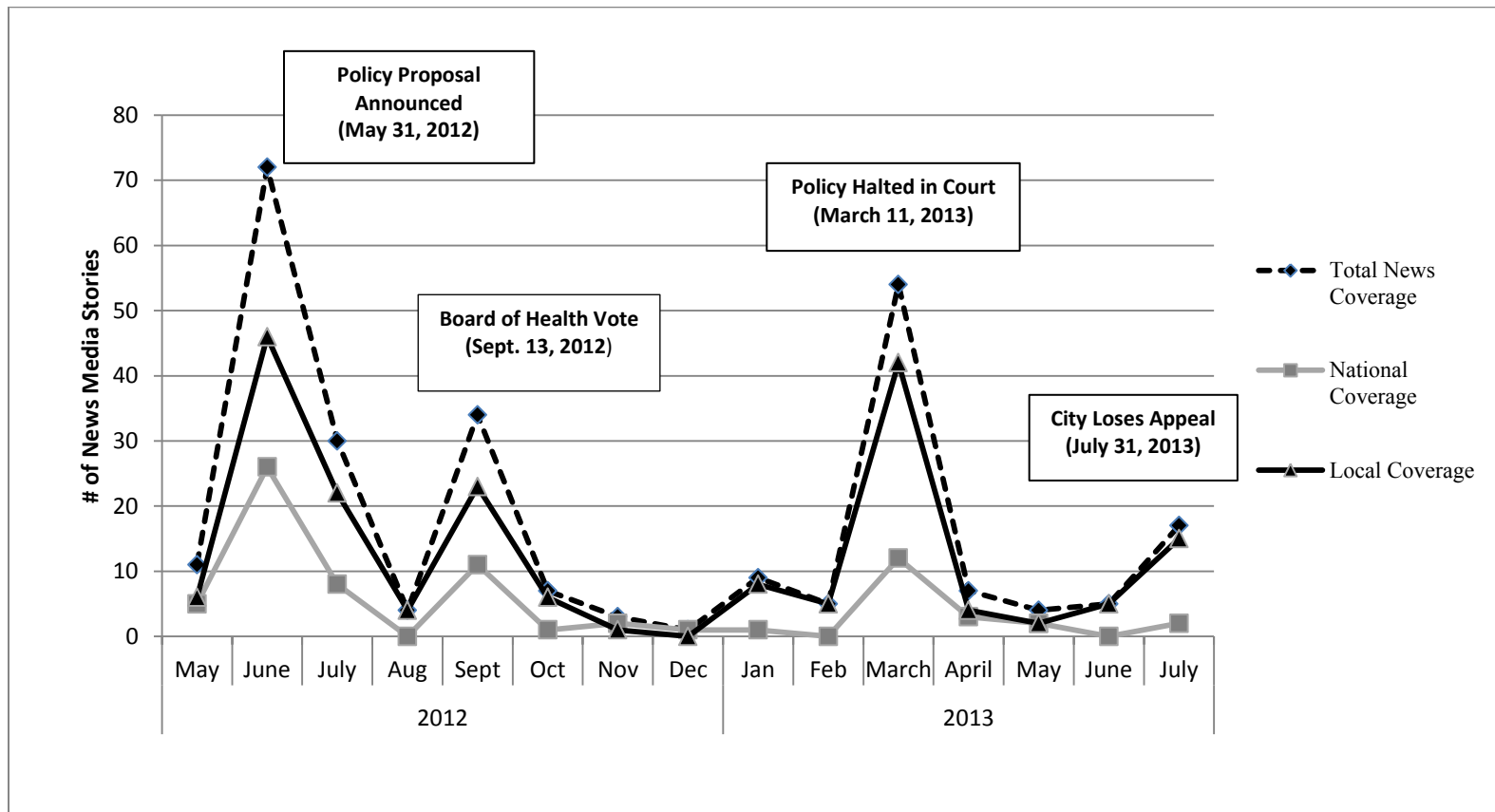
Items	Raw Agreement (%)	Kappa Statistic
<b>News Stories Framing the Problem of Obesity</b>		
Mentions that obesity is a problem	92.5	0.85
Mentions that SSB consumption is a cause of obesity	95.2	0.87
Mentions the role of the industry in contributing to SSB consumption or obesity	94.5	0.61
Mentions the role of individual choice, behavior, or lifestyles in contributing to SSB consumption or obesity	90.4	0.61
<b>News Stories Framing the Characteristics of the SSB Portion Size Cap</b>		
Mentions that the aim of the policy is to improve health	80.7	0.62
Mentions that the policy only includes certain types of beverages	97.9	0.95
Mentions that the policy only includes certain locations where SSBs are sold	95.9	0.91
Mentions that individuals can purchase refills or more than one 16-oz beverage	93.8	0.83
Mentions that NYC Health Department has considered or enacted other obesity specific public health interventions	95.0	0.80
Mentions that NYC Health Department has considered or enacted other, non-obesity specific public health interventions	90.0	0.75
<b>Pro-SSB Portion Size Cap Frames</b>		
Mentions the portion size cap policy will have a positive health impact	84.3	0.61
Mentions the policy will increase awareness of SSB harms and obesity risk factors	96.4	0.88
Mentions the policy will reduce the amount of SSBs consumed	89.1	0.63
Mentions the policy will decrease morbidity or mortality from obesity	92.9	0.78
Mentions the portion size cap policy will help special populations	95.9	0.73
Mentions the policy could help children/adolescents	100.0	1.00
Mentions the policy could help low income groups/neighborhoods	100.0	1.00
Mentions the policy could help racial/ethnic minorities	100.0	1.00
Mentions the portion size cap policy is part of the government's role or responsibility	92.5	0.63
<b>Con-SSB Portion Size Cap Frames</b>		
Mentions the portion size cap policy is flawed or will be ineffective	83.6	0.65
Mentions the policy is flawed because it does not cover all types of beverages	93.8	0.71
Mentions the policy is flawed because it does not cover all locations where SSBs are sold	90.3	0.66
Mentions the policy is flawed because individuals can purchase refills	96.5	0.73
Mentions the policy is flawed because it will not reduce obesity	92.8	0.67

Mentions the policy is flawed because SSBs do not cause obesity	98.2	0.74
Mentions the portion size cap policy could hurt the local economy	93.8	0.78
Mentions the policy will impact small businesses	95.0	0.88
Mentions the portion size cap policy will hurt special populations	97.3	0.74
Mentions fairness or a related term	100.0	1.00
Mentions the portion size cap policy is not feasible		
Mentions the public does not like the policy	91.8	0.72
Mentions the policy is not feasible or will be difficult to enact or implement	95.2	0.64
Mentions the policy is illegal, unconstitutional, or “arbitrary and capricious”	97.3	0.89
Mentions the portion size cap policy is not part of the government’s role or responsibility	86.3	0.70
Mentions free choice, consumer rights, or protection of independence	85.5	0.70
Mentions the policy is an overreach or outside of the government’s role or responsibilities	80.7	0.62
Mentions “nanny” or “nanny state”	100.0	1.00
Mentions the policy is a slippery slope	97.8	0.92
Mentions the portion size cap policy is not the best solution	97.3	0.88
Mentions a built environment change is a better solution	94.1	0.82
Mentions a school environment change is a better solution	100.0	1.00
Mentions neighborhood or community programs are a better solution	88.2	0.60
Mentions mass media or education campaigns are a better solution	94.1	0.88
Mentions legislation or regulation is a better solution	88.9	0.75

### **Appendix 3-5. Stakeholder Group Categories**

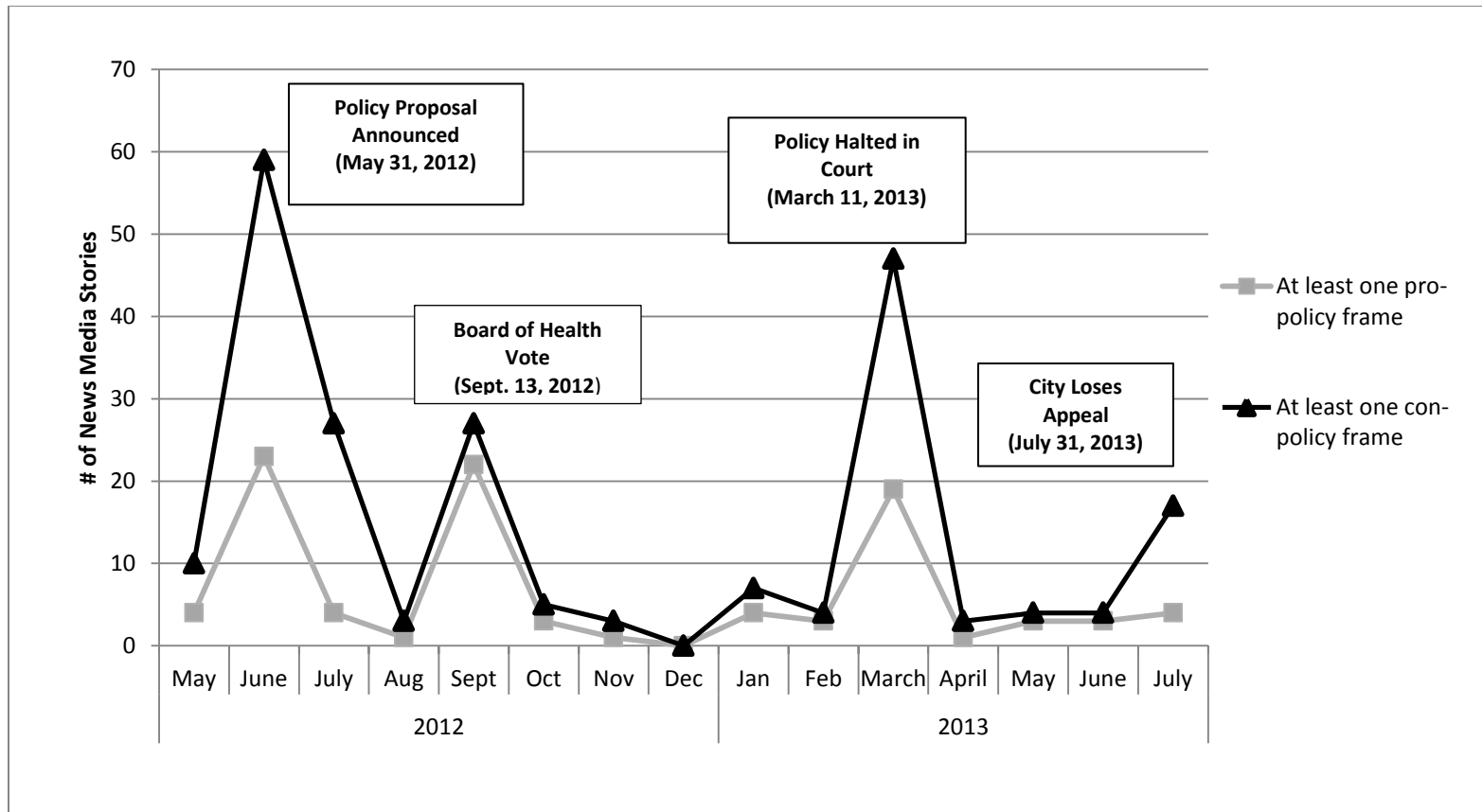
The government officials category includes elected and appointed government officials, as well as government agency staff (e.g., City Council member, NYC Department of Health and Mental Hygiene). The industry representatives category includes individuals or organizations who are associated with beverage or food industry, such as those representing industry interests (e.g., American Beverage Association), the food and beverage manufacturers and distributors (e.g., Pepsi Co.), as well as individual business owners (e.g., NYC bodega store owner). The citizens and citizens groups category includes individuals not affiliated with one of the other stakeholder categories, including residents of NYC and patrons of NYC restaurants and stores (e.g., John Smith, Bronx resident). The academic researchers category includes individual researchers, research centers (e.g., Yale Rudd Center for Food Policy and Obesity), and academic institutions (e.g., Johns Hopkins University). The public health representatives category includes individuals or organizations that have a public health interest and are not associated with one of the other categories (e.g., National Association of County and City Health Officials, American Cancer Society). The medical professionals category includes medical professionals (e.g., physicians, dietitians, nurses), as well as organizations representing these professionals (e.g., American Medical Association).

**Appendix 3-6. National vs. Local News Coverage of Pro- and Con –Frames about the NYC Portion Size Cap Regulation, May 31, 2012-July 31, 2013**





**Appendix 3-7. Inclusion of Pro- and Con- Frames about the NYC Portion Size Cap Regulation, May 31, 2012-July 31, 2013**



**Appendix 3-8. News Coverage of NYC Portion Size Cap Regulation by News Outlet Characteristic, May 31, 2012-July 31, 2013**

News Outlet Characteristic	At Least One Pro-Policy Frame	At Least One Con-Policy Frame
	n (%)	n (%)
Source		
Television	21 (41.2)	<b>46 (90.2)*</b>
Print	74 (34.9)	<b>174 (82.1)*</b>
2012 Presidential Endorsement		
Democrat Candidate Endorsement	33 (37.1)	77 (86.5)
Republican Candidate Endorsement	29 (35.4)	62 (75.6)

\* p-value <0.05 indicating frames in news stories that differ significantly across the news outlet characteristic controlling for news story word count and adjusting standard errors for non-independence of news outlets.

**Appendix 3-9. Stakeholder Opinions in News Coverage of NYC Portion Size Cap Regulation, May 31, 2012-July 31, 2013**

<b>Stakeholder Perspective Quoted or Paraphrased in the News Story</b>	<b>Overall</b>	<b>Television News</b>	<b>Print News</b>
	n (%)	n (%)	n (%)
Pro-Policy and Con-Policy Stakeholders	123 (50.6)	31 (65.9)	92 (46.9)
Pro-Policy Stakeholders Only	51 (20.9)	8 (17.0)	43 (21.9)
Con-Policy Stakeholders Only	69 (28.4)	8 (17.0)	61 (31.1)

**CHAPTER 4- PUBLIC SUPPORT FOR A SUGAR-SWEETENED BEVERAGE  
TAX AND PRO-TAX MESSAGES IN A MID-ATLANTIC US STATE**

## **Public Support for a Sugar-Sweetened Beverage Tax and Pro-Tax Messages in a Mid-Atlantic US State**

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### **Citation:**

**Donaldson EA, Cohen JE, Rutkow L, Villanti AC, Kanarek NF, Barry CL (2014). Public Support for a Sugar-Sweetened Beverage Tax and Pro-Tax Messages in a Mid-Atlantic US State. *Public Health Nutrition*, 28: 1-11.**

## **ABSTRACT**

**Objective:** To examine the characteristics of supporters and opponents of a sugar-sweetened beverage (SSB) tax, and to identify pro-tax messages that resonate with the public.

**Design:** A survey was administered by telephone in February 2013 to assess public opinion about a penny-per-ounce tax on SSBs. Support was also examined for SSB consumption reduction and pro-tax messages. Individual characteristics including socio-demographics, political affiliation, SSB consumption behaviors, and beliefs were explored as predictors of support using logistic regression.

**Setting:** A representative sample of voters was recruited from a Mid-Atlantic US state.

**Subjects:** The sample included 1,000 registered voters.

**Results:** Findings indicate considerable support (50%) for a SSB tax. Support was stronger among Democrats, those who believe SSBs are a major cause of childhood obesity, and those who believe childhood obesity warrants a societal intervention. Belief that a tax would be effective in lowering obesity rates was associated with support for the tax and pro-tax messages. Respondents reporting that a health care provider had recommended that they lose weight were less convinced by pro-tax messages. Women, Independents, and those concerned about childhood obesity were more convinced by the SSB reduction messages. Overall, the most popular messages focused on the importance of reducing consumption among children without mentioning the tax.

**Conclusions:** Understanding who supports and opposes SSB tax measures can assist advocates in developing strategies to maximize support for this type of intervention.

Messages that focus on the effect of consumption on children may be useful in framing the discussion around SSB tax proposals.

## INTRODUCTION

In the United States, obesity has emerged as a critical public health issue over the past three decades as prevalence has more than doubled in adults and tripled in children.<sup>1</sup> <sup>2</sup> Sugar-sweetened beverage (SSB) consumption is considered an important driver of the obesity epidemic<sup>3</sup> as intake leads to weight gain<sup>4-6</sup>, and as consumption rates in children and adults have almost tripled since the 1970s.<sup>7</sup> Many US states and localities have sought to reduce SSB consumption by increasing taxes on these beverages; however, to date no US jurisdiction has successfully enacted a tax. Numerous studies have estimated the potential effect of a tax on SSB consumption and the prevalence of obesity, primarily for taxes that would be higher than the current state sales tax on these beverages in the range of a penny-per-ounce or more.<sup>8-12</sup>

While studies have examined the potential effect of a SSB tax<sup>8-12</sup>, few studies have explored public knowledge and attitudes toward a SSB tax.<sup>13-15</sup> Although several public opinion polls have been conducted and published in the gray literature, their findings on overall support were mixed.<sup>16-20</sup> A Pew Research Center Report polled Americans in October 2013 and found that 63% believed that obesity has societal consequences; however, only 35% of respondents favored a SSB tax.<sup>16</sup> Among the few peer-reviewed studies, a 2013 article by Barry et al. examined the SSB tax arguments that resonated with US adults, finding greater agreement with anti-tax compared to pro-tax arguments overall.<sup>13</sup> Gollust et al. conducted a national survey in 2012, finding that 22% of respondents supported SSB taxes.<sup>14</sup> The authors found that Democrats, young adults (18 to 29 years), individuals with a college education and those who have a negative opinion toward the beverage industry had higher levels of support.<sup>14</sup> Rivard et al. (2012)



studied consumption patterns, knowledge of SSB harms, and public support for a SSB tax across the US and found that 36% of adults support SSB taxes.<sup>15</sup> Young adults (18 to 25 years), those with at least some college, and non-obese individuals ( $BMI < 30 \text{ kg/m}^2$ ) were more likely to support the tax.<sup>15</sup>

Prior studies focused on SSB taxes and tax messages in national samples and found limited support. Public opinion surveys can contribute to public health practice and advocacy around policymaking, including SSB taxes.<sup>42</sup> However, the current literature may be limited by its national focus because studies are unable to explore more nuanced characteristics of supporters and opponents within particular regions or states. This study builds on the existing literature by examining a comprehensive set of characteristics of supporters of a SSB tax, pro-tax messages, and SSB consumption reduction messages.

This study addressed three research questions: (1) What are the characteristics of supporters and opponents of a state-level SSB tax? (2) What are the characteristics of individuals persuaded and not persuaded by messages about reducing SSB consumption? (3) What are the characteristics of supporters and opponents of pro-SSB tax messages? We hypothesized that individuals who believe SSBs are associated with obesity, believe that a SSB tax will be effective at reducing consumption, or are concerned with childhood obesity will be more likely to support the SSB tax and that Republicans and SSB consumers will be less likely to support the tax. Second, we hypothesized that adults with higher education or those who believe SSBs are associated with obesity will be more likely to favor one or more of the SSB consumption or pro-SSB tax messages.

## METHODS

### *Sample*

A survey was conducted in February 2013 using a randomly selected sample of voters in a Mid-Atlantic state based on voter records obtained from the State Board of Elections in October 2012. The Mid-Atlantic region includes states in the Northeastern US including Delaware, Maryland, Pennsylvania, Washington, D.C., Virginia, and West Virginia.<sup>46</sup> Survey questions were developed based on a review of a national survey.<sup>13</sup> The survey was piloted for length. A stratified sampling strategy, stratified by geographic location and political party, identified a representative sample of voter records that reflected the proportionality of these characteristics in the entire state voter population. Telephone numbers for the selected voter records were obtained by linking voter registration information to landline and cellular telephone databases using a commercial provider.<sup>22</sup> The survey was administered by landline or cellular telephone to individuals who provided verbal consent to participate upon answering the phone. A total of 25,000 voter records were obtained through the stratified sample. Cellular and landline telephone numbers were dialed until the final desired sample size (n=1,000) was obtained. A description of the weighted and unweighted sample characteristics as compared to overall state demographics is provided in **Appendix 4-1**. The response rate was not collected by the contractor administering the survey. However, in comparing the sample participants to the overall state characteristics, respondents are similar to the state in terms of gender and political party as illustrated in **Appendix 4-1**.

### ***Outcome Measures***

Three dependent variables were examined in the analysis: (1) SSB tax support, (2) support for SSB consumption reduction messages, and (3) support for pro-SSB tax messages. Support for a SSB tax was measured by asking: “If health experts proposed adding a tax of one penny-per-ounce to the price of regular soda and other drinks with added sugar for the purpose of reducing teen consumption and preventing childhood obesity, would you favor or oppose that?” Response options were: “Oppose” or “Favor.”

Two additional dependent variables were examined - whether messages regarding SSB consumption were convincing and whether pro-SSB tax messages were convincing (**Table 4-1**). A random sample of half of the respondents rated the three messages in Panel A based on whether each was a convincing reason to consume fewer sugary drinks. The other half of respondents rated the four messages in Panel B based on whether each offered a convincing reason to favor a SSB tax. Support for each message was assessed on a five-point Likert scale from “Not convincing at all” to “Very convincing.” Responses were collapsed, with responses of 4 or 5 considered “Convincing” and responses of 1 to 3 coded as “Not convincing.” **Table 4-1** provides the messages and the proportion who found the messages convincing in each Panel. In the multivariable analysis, the messages in each Panel were combined to create a dichotomous outcome that examined support for one or more of the messages as compared to not supporting at least one of the messages in the Panel. The Cronbach’s alpha coefficient evaluating internal consistency of the items in each panel was 0.53 for the Panel A messages and 0.76 for the Panel B messages. An exploratory factor analysis was also conducted to identify if the messages within each Panel grouped together. The factor analysis revealed

that a one factor solution worked best for both Panel A and Panel B. These findings support the grouping of messages within each Panel.

The main independent variables were grouped in three categories: (1) respondent socio-demographic characteristics, (2) respondent SSB consumption and health behaviors, and (3) respondent beliefs. Socio-demographic characteristics included: age, gender, race, political affiliation, education, and annual 2012 income before taxes. All characteristics were assessed through self-report except for age and political affiliation, which were identified from the respondent's voter registration.

Self-reported daily SSB consumption was assessed. The SSB definition included soda, sugar-sweetened iced tea, sports drinks, energy drinks, and fruit drinks. This definition did not include one hundred percent fruit juice and diet drinks. Daily consumption was structured as a dichotomous variable to compare those drinking at least one SSB each day to those drinking less than daily, including weekly and never consumers. SSB availability at home was assessed by asking respondents to report whether they had one or more SSB types at home. Respondents were also asked about their perception of the addictiveness of SSBs. Response choices were: "Not addictive or habit forming," "Addictive," or "Habit Forming." Lastly, respondents were asked if a health care provider had ever recommended weight loss.

The final group of independent variables captured respondent beliefs. To assess their belief in the effectiveness of SSB taxes, respondents were asked, "In general, do you think that making sugary drinks more expensive would help cut down on their consumption?" In exploring their belief regarding SSBs and the childhood obesity epidemic, respondents were asked, "Do you think there is a connection between children

drinking sugary drinks - like soda - and childhood obesity?” Respondents were also asked if a health expert’s opinion would motivate them to reduce consumption: “If health experts said sugary drinks are a major cause of obesity or weight gain, would that strongly motivate you to drink fewer sugary drinks, motivate you a little bit, or not really motivate you?” In addition, respondents were asked whether they considered childhood obesity a concern on a four-point scale from 1 “Very Important” to 4 “Not at all Important.” Their responses were dichotomized with responses of 1 or 2 indicating “Concern” and responses of 3 or 4 indicating “No or Little Concern.” Lastly, respondents were asked about their perspective on whether obesity warrants a parental or societal solution with the following question: “Which of these is closer to your own view?” Response options included: “More needs to be done by society to reduce or prevent childhood obesity in the state,” or “Reducing childhood obesity is mainly a parent’s concern.” **Appendix 4-2** provides a summary of the survey instrument and variables included in the current analysis.

### ***Statistical Analysis***

Stata 11 svy procedures were used to account for the sampling design.<sup>21</sup> Pearson’s chi-square tests, adjusted to account for the sampling design, were conducted to determine whether opinion of the tax differed by respondent characteristics. Three multivariable logistic regression models were used to examine support for the tax. The first model included socio-demographic variables including political affiliation, race/ethnicity, education, income, age, and gender. The second model expanded the first model and included SSB consumption and availability, perception of SSB addictiveness,

as well as health care provider suggested weight loss. The third and final model extended the previous two models to include beliefs regarding the effectiveness of SSB taxes, the relationship between SSBs and childhood obesity, concern for childhood obesity, the perceived solution for childhood obesity, as well as self-reported motivation to reduce consumption in response to health experts linking SSBs to obesity. Beliefs were included in the extended model because we hypothesized a priori that they would be important for explaining SSB tax and message support. In examining the outcome of being convinced by the Panel A (SSB consumption) messages and the outcome of finding Panel B (pro- SSB tax) messages convincing, multivariable logistic regression models were estimated that included all of the independent variables.

All models were weighted to account for the sampling design. Post-stratification weights were developed based on race (White, African American or Other), gender, and age (18 to 65) of residents in the state and registered voters from the 2012 US Census.<sup>35,</sup>  
<sup>43</sup> In addition, two of the most densely populated counties in the state were weighted to account for their overrepresentation in the sample population. Akaike's Information Criterion and the Hosmer-Lemeshow goodness-of-fit test were used to assess each model's fit without accounting for the survey sampling design.<sup>36, 37</sup> The F-adjusted mean residual goodness-of-fit test was also applied to assess model fit while taking the sampling design into account.<sup>37</sup>

## RESULTS

The final study sample included 1,000 registered voters from a Mid-Atlantic state (**Table 4-2**). Fifty-two percent was female and a majority was White (62%) and

affiliated with the Democratic Party (56%). A majority (84%) were 35 years of age or older. Fifty-one percent had a bachelor's degree or post-graduate education and a majority (75%) made more than \$50,000 in annual income. Twenty-seven (27%) consumed one or more SSBs daily and 46% had SSBs available at home. Sixty-one percent of respondents did not believe that a tax would be effective in reducing consumption but a majority believed that SSBs were either addictive (61%) or habit forming (22%). Most respondents also believed that SSBs are a major (52%) or minor (37%) cause of childhood obesity. Similarly, most respondents (85%) reported a belief that childhood obesity is an important concern. Only 38% believed that a societal intervention was warranted as an obesity solution. Almost two-thirds (65%) reported being motivated to reduce SSB consumption if a health expert links SSBs with obesity. Lastly, 42% had been told by a provider to lose weight. In comparison to the state as a whole, the race/ethnicity of the sample included slightly more White respondents (62% vs. 60%) (**Appendix 4-1**). Furthermore, the current sample was more educated (51% vs. 30% bachelor's degree or higher) and had a higher annual income (75% vs 68% \$50,000 or more) relative to the state.

Overall, fifty percent of respondents supported a state SSB tax (**Table 4-2**). Gender, race/ethnicity and political party were associated with support (p-values <0.05). A significantly greater proportion of females, Democrats and individuals who identified with a race/ethnicity other than White supported the tax. Daily consumption of SSBs and having them at home were associated with reduced support for the tax (41% daily vs. 54% non-daily; 43% home vs. 56% not at home, respectively; p-values <0.05). Respondents who considered childhood obesity an important problem, as well as those

who viewed the problem as a societal concern rather than a parental issue, supported the state tax (54% concern vs. 29% not a concern; 73% societal vs. 36% parental, respectively;  $p$ -values  $<0.05$ ).

**Table 4-3** illustrates the multivariable logistic regression models examining supporters of the SSB tax. In Model 1, gender, political party, and education were associated with support. The odds of support were one-third lower among males compared to females (OR: 0.68;  $p<0.05$ ). Republicans and Independents had 50- 60% lower odds of supporting the tax compared to Democrats (OR: 0.35;  $p<0.001$  Republicans; OR: 0.49;  $p<0.05$  Independents). In addition, respondents with some college education or more had over 1.5 times the odds of supporting the tax compared to those with a high school education or less.

When the model was extended to include SSB consumption and health behaviors (see Model 2), Democrats and those with a post-graduate education remained more likely to support the tax. The odds of support were 47% lower among daily SSB consumers (OR: 0.53;  $p<0.05$ ). Individuals who perceived SSBs as habit forming or addictive had 2 or more times the odds of supporting the tax compared to respondents not holding those views (OR: 1.97;  $p<0.05$  habit forming; OR: 2.27;  $p<0.05$  addictive). Lastly, respondents who were told by a health care provider to lose weight had 36% lower odds of supporting the SSB tax compared to those not receiving this recommendation (OR: 0.64;  $p<0.05$ ).

The final model was extended to further include respondent beliefs while adjusting for all of the variables examined in the previous two models (see Model 3). Among the socio-demographic characteristics, Republicans and Independents continued to have lower odds of supporting the tax compared to Democrats after adjustment for all



of the covariates (OR: 0.55;  $p < 0.05$  Republicans; OR: 0.45;  $p < 0.05$  Independents).

Respondents had over 2 and a half times the odds of supporting the tax if they believed that SSBs are a major cause of obesity in children, that a tax will be effective at reducing consumption, or that obesity is a problem best solved by a societal solution compared to a parental solution (OR: 2.80;  $p$ -value:  $< 0.05$  SSBs a major cause; OR: 2.78;  $p < 0.001$  tax is effective; OR: 2.84;  $p < 0.001$  societal concern). The model fit statistics illustrate that all three models fit according to the AIC and Hosmer-Lemeshow goodness-of-fit test. The final model did not fit after taking the survey design into account in the goodness-of-fit test.

In exploring agreement with the SSB consumption reduction messages in Panel A, the message on SSBs and child weight, as well as the message about learning healthy habits in childhood were convincing to a majority of the random half of respondents receiving them (**Table 4-1**). Less than half (41.2%) reported being convinced to reduce consumption of SSBs by the message conveying expert opinion of the contribution of sugary drinks to the obesity epidemic. None of the pro-tax messages in Panel B were convincing to a majority of respondents. Among the four pro-tax messages, the message that received the most support (37.6%) focused on using tax revenue to create a counter marketing and education strategy about the beverage industry.

The analyses presented in **Table 4-4** show the characteristics of individuals who reported being convinced by at least one of the messages in the panel they received (i.e., either Panel A's messages about SSB consumption reduction or Panel B's pro-SSB tax messages). In Panel A's multivariable model including all covariates, males were less likely than females to find one or more of the messages convincing (OR: 0.34;  $p < 0.05$ ).

Individuals earning an income between \$50,000- \$100,000 had lower odds of being convinced by the messages compared to the highest income group of more than \$100,000 (OR: 0.25;  $p=0.05$ ). Independents had higher odds of being convinced by the consumption reduction messages relative to Democrats (OR: 18.3;  $p<0.05$ ). In addition, SSB consumers who reported being motivated to reduce their intake were more likely to be convinced by one or more of the messages compared to less motivated drinkers (OR: 3.13;  $p<0.05$ ). Lastly, individuals who believed childhood obesity is a problem had over four times the odds of being convinced by the messages compared to those not concerned about childhood obesity (OR: 4.50;  $p<0.05$ ).

In the multivariable model examining respondents convinced by one or more pro-SSB tax messages (Panel B), only two characteristics remained significant after adjustment for the covariates. Respondents who reported having a healthcare provider suggest weight loss had 49% lower odds of finding one or more of the pro-tax messages convincing (OR: 0.51;  $p<0.05$ ). Individuals who believed that a SSB tax will be effective at reducing consumption had over six times the odds of being convinced by one or more of the pro-tax messages (OR: 6.21;  $p<0.001$ ). Both message Panel A and Panel B models fit according to all of the fit statistics with the exception of Panel A's model fit when the goodness-of-fit test took survey design into account.

## **DISCUSSION**

As states across the US consider policy interventions to address the obesity epidemic, the present survey of voters in a Mid-Atlantic state found that 50% support a state penny-per-ounce tax on sugar-sweetened beverages (SSB). Compared to previous

polls and studies, the current study observed a higher level of support for a SSB tax (50% in the current state in February 2013 compared to 22% to 36% in previous national studies conducted in 2009-2010, 2012, and 2013).<sup>13, 15-16</sup> Diffusion of Innovations theory would suggest that a majority of voters may soon be in support of this issue based on the swift rise in support across polls over the past four years.<sup>44</sup>

In this sample of state registered voters, SSB consumption levels are lower than national estimates with 27% of respondents self-reporting daily consumption compared to 51% of adults over age 20 that consume one or more SSBs daily through dietary recall in the 2009-2010 National Health and Nutrition Examination Survey.<sup>23</sup> Despite the lower SSB consumption prevalence in the state, daily drinkers were still less supportive of the tax. Similar to findings in tobacco control where smokers do not often favor increases in tobacco taxes<sup>24</sup>, this study observed that daily SSB drinkers were less likely to support the tax than less than daily consumers. Also, as hypothesized and similar to previous studies, Democrats were more supportive of the SSB tax compared to Republicans and Independents.<sup>14, 16</sup> However, unlike previous opinion surveys, age was not associated with support in the current study.<sup>14-15</sup> Income was also not associated with support. Given that over a quarter of the sample had an annual income over \$100,000 and half had more than a 4-year college education it may be that the current sample of registered voters did not include enough low socioeconomic respondents to identify differences in support as compared to the studies with national samples. Education, however, was associated with support after belief variables were included in the fully-adjusted model. Similar to previous studies, the current analysis found that those with a college education were more supportive of the tax.<sup>14-15, 25</sup>

The hypotheses regarding a belief that childhood obesity is a problem caused by SSBs and a belief that a tax will be effective in reducing consumption were borne out in these data. Both beliefs were associated with SSB tax support after adjusting for socio-demographic and SSB consumption behaviors. Additionally, respondents who believed childhood obesity warrants a societal intervention were more supportive of the tax even after adjustment for other covariates. While 85% of respondents in the current analysis believed that childhood obesity was an important concern, only 38% agreed with a societal intervention for the problem. Other studies have observed that even if American respondents agree that obesity has societal consequences, they have higher support for individual-level solutions over societal options.<sup>16, 25-30</sup> For example, a Pew Research Center Report observed that a majority (63%) of Americans view obesity as having consequences for society but, as supported by the present study, comparatively few agree with societal level solutions such as taxes.<sup>16</sup> Additionally, several studies have observed a rise in concern for obesity as a national health issue without an increase in support for government intervention largely due to perceptions that obesity is an individual's responsibility.<sup>25-30</sup> Niederdeppe et al. (2011) used the theory of perceived responsibility and social motivation<sup>31</sup> to explore beliefs about the causes of obesity as a means to understand support for obesity policies.<sup>32</sup> The authors found that many respondents believed that individuals should be responsible for solutions to the obesity epidemic because obesity is associated with a lack of willpower.<sup>32</sup> Similar to the present study, other studies have observed that those who believe someone other than the individual should address the obesity problem have greater support for interventions such as raising taxes.<sup>32-33</sup>

Similar to those who reported support for the SSB tax, respondents who found one or more of the SSB consumption reduction messages convincing were more likely to be female. In addition, a positive association was observed between SSB drinker motivation to reduce consumption and support for the consumption messages. Furthermore, concern for childhood obesity was also positively associated with support for the messages. Lastly, a majority of voters perceived SSBs as addictive or habit forming (83%) and evidence suggests that the sugar in these drinks has addictive properties, such as inducing cravings.<sup>45</sup> As most respondents (77%) supported the SSB consumption message about reducing unhealthy habits during childhood, the perception of sugar's addictiveness may be an important consideration for future message development even though it did not predict support for the group of consumption messages in this analysis.

Overall, a majority of respondents were convinced by two of the SSB consumption reduction messages, with less than 40% of respondents convinced by any of the pro-SSB tax messages. Similarly, Barry et al. (2013) found in a national sample that none of the pro-tax messages were supported by a majority of the participants.<sup>13</sup> In the present study, the two messages that had the most agreement focused generally on the importance of reducing SSB consumption among children without mentioning the tax. The two pro-tax messages that received the least support from respondents emphasized the benefits of taxing SSBs for the purpose of reducing consumption among teens and adults, as well as in helping parents modify child drink choices. Therefore, it may be important for advocates of SSB taxes to frame the discussion around the potential effect of a state tax on consumption in children as opposed to a strategy that targets adolescents

and adult consumption. Jou et al. (2014) assessed the perceived effectiveness of SSB tax messages through stakeholder interviews and found that messages emphasizing the relationship between SSB consumption and health outcomes, as well as those that noted using the tax revenue for health programs, were perceived as effective.<sup>38</sup> Similar to the current study, which found the highest support among the pro-tax messages for the message on counteracting industry advertising, Jou et al. (2014) observed support for messages that focused on the effect of the beverage industry on children.<sup>38</sup>

### *Limitations*

The current analysis is based on a survey of registered voters in a single Mid-Atlantic US state. Sample weights were incorporated in the analysis based on the race/ethnicity, gender, and age distribution of the state's US Census data. However, the weighting did not take into account non-response or different response rates for landline and cell phone respondents. In addition, the sample was obtained from voter records and not necessarily voters in the last election. Therefore, although the sample strives to be representative of a single Mid-Atlantic state, the results cannot be generalized to other states.

Additionally, the response or cooperation rates were not collected by the contractor administering the telephone survey. Potential reasons that individuals in the selected 25,000 voter records might not have responded could include household inaccessibility due to limited landline phone numbers and individuals not responding on their cell phones.<sup>39</sup> Therefore, an important limitation is that it is unknown how many individuals were contacted. Moreover, it is not known what proportion of individuals in

the voter record sample or of those contacted agreed to participate in the survey. The importance of ascertaining and evaluating response rate has been widely studied.<sup>40</sup> We do not know the scope of non-response in the sample, and therefore, cannot compare the response rate in the current survey to similar studies. Furthermore, we cannot assess whether respondents and non-responders differed substantially in terms of their demographic characteristics or in their support for a SSB tax. If responding to the survey is correlated with opinion of the SSB tax, it could bias the study findings. For example, if non-responders were more likely to oppose the tax then the analysis would overestimate support in the state's voter population. Also, the estimates made in the analysis are intended to represent the state's population but if respondents differ from non-responders, this would affect the external validity or generalizability of the study findings to the underlying population of interest. Although the response or cooperation rate is an important piece of information to report, the American Association for Public Opinion Research (AAPOR) notes that the response rate is not the only method of assessing survey quality.<sup>41</sup> The AAPOR recommends that additional survey information, including the amount of missing data and comparability with other research, should be evaluated to assess quality as well.<sup>41</sup> The limited missing data and comparability of the findings in the current study to previous research are strengths.<sup>14-16, 25</sup> Furthermore, the weighted final sample is similar in regard to gender and political party compared to the state as a whole. Finally, despite the important limitation of not having a response rate, the current analysis included both cell phone and landline telephone numbers to contact voters, and respondents were not initially aware that they would be asked about a tax.

Another limitation is that two of the three fully adjusted models did not fit according to the F-adjusted goodness-of-fit test. However, the models likely have sufficient fit based on results of the other tests.

Lastly, respondents received one of two message groups. Panel A assessed messages about reducing SSB consumption whereas Panel B assessed pro-SSB tax messages. The messages within each Panel were read to each respondent in a random order; therefore, priming of respondents in terms of the order of the messages received would have been minimized. However, the question assessing SSB tax support may have primed respondents and biased our analysis toward higher levels of support because it noted the purpose of the tax. Additionally, priming could have occurred if respondents were exposed to other messages within the state as some localities and organizations were promoting SSB policy interventions around the time the survey was fielded. Given that the current study was not designed to test messages and the full sample was not exposed to all messages, these findings offer a snapshot of message support and cannot be used to evaluate the relative salience of one message over another.

### *Conclusion*

The present study examined supporter characteristics of a state SSB tax. In regard to the potential effect of a SSB tax on consumption, modeling studies suggest that a penny-per-ounce excise tax (a 20% increase in SSB price), would reduce consumption by 15% to 24% and reduce weight by approximately 0.7 pounds per year, preventing over 20,000 premature deaths by 2020.<sup>8-10</sup> The potential revenue from a SSB tax in the Mid-Atlantic state in this study would be over \$200 million each year.<sup>34</sup> The findings of the



current study, as well as knowing the anticipated effect of the tax, could help advocates and policymakers identify potential coalition members and organizations for campaigns. The findings could inform advocates and policymakers regarding the characteristics of supporters and opponents of a SSB tax as a way to assess political feasibility. Although only half of respondents in this Mid-Atlantic state supported the SSB tax, this level of support is higher than in previous national surveys. Therefore, perhaps this intervention may be more politically feasible in specific states or after mobilizing certain population sub-groups, such as Democrats and females who reported support for the measure.

By exploring messages that resonate with specific voter groups, the findings could assist advocates in framing the discussion around this type of policy proposal to build coalition support. These findings suggest that advocates should focus on disseminating and promoting messages around (a) a societal solution to obesity that balances messages focused on individual change alone, (b) the potential effectiveness of SSB taxes in reducing consumption and generating revenue for childhood obesity programs, and (c) the relationship between obesity and SSBs to enhance the public's understanding of the effect of SSBs on health outcomes.

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## Tables and figures

**Table 4-1. Sugar-sweetened beverage consumption and pro-SSB tax messages**

Panel A			
Sugar-Sweetened Beverage Consumption Messages		n	% Convinced (95% CI) Weighted
Experts link weight and SSBs	Experts say that 20% of our nation's weight problems have been caused by sugary drinks alone.	486	41.2 (36.6, 45.9)
SSBs and child weight	Eliminating just one sugary drink a day from a child's life could help them lose 10-15 pounds in one year.	474	57.5 (52.6, 62.2)
Healthy habits learned in childhood	Healthy habits are learned when children are young. It is important to reduce sugary drink consumption so that children do not continue unhealthy habits into adulthood.	490	76.9 (72.7, 80.6)

Panel B			
Pro-Tax Messages		n	% Convinced (95% CI) Weighted
Tax is a tool for parents	Making sugary drinks more expensive gives parents a tool they can use to help discourage their kids' unhealthy habits outside the home.	494	30.4 (26.3, 34.9)
Tax counteracts industry	The soft drink industry unfairly targets children with their advertising. Money from a tax on sugary drinks could be used to counteract these ads and educate parents and children about the link between sugary drinks and obesity.	488	37.6 (33.1, 42.3)
Tax reduces consumption	Experts say a tax on sugary drinks is the most effective thing you can do to reduce teen and adult consumption.	492	21.6 (17.9, 25.8)
Tax revenue for obesity prevention	A penny per ounce tax on sugary drinks in the state could raise almost half a billion dollars over the next two years to fund obesity prevention efforts in our schools and community.	482	35.9 (31.5, 40.7)

**Table 4-2. Sugar-sweetened beverage tax support by respondent characteristics: a US Mid-Atlantic state registered voter sample (n=1,000), February 2013**

Characteristics	Overall Weighted <i>n</i> =1,000 %	Support SSB Tax Weighted %	P value <sup>a</sup>
Opinion of SSB Tax			
Support	50.2	----	----
Age, years			
35 and older	83.7	50.4	0.91
18 to 34	16.3	49.7	
Gender			
Female	52.4	55.3	<0.05
Male	47.6	44.9	
Race/Ethnicity			
White	62.4	46.1	<0.05
African-American/Black	25.5	60.1	
Other (Hispanic, Asian, Multiracial)	12.1	55.9	
Political Party			
Democrat	55.6	60.6	<0.001
Republican	24.9	30.2	
Independent or Other	19.5	46.9	
Education			
High School or Less	24.7	45.2	0.45
Some College/Associate's Degree	24.8	51.9	
4-Year College/Bachelor's Degree	27.7	52.2	
Post-Graduate	22.8	51.3	
Income, annual before taxes			
≥\$100,000	35.6	52.7	0.63
\$50,000 to <\$100,000	39.7	50.9	
< \$50,000	24.7	56.0	
Childhood Obesity Important Concern			
Yes	84.9	54.1	<0.001
No	15.0	29.0	
Childhood Obesity Solution			
Parental Concern	62.2	36.0	<0.001
Societal Concern	37.8	73.6	



Daily SSB Consumption				
	Yes	27.2	41.2	<0.05
	No	72.8	53.7	
SSBs at Home				
	Yes	45.8	43.1	<0.05
	No	54.2	56.4	
Health Care Provider Suggested Weight Loss				
	Yes	42.3	46.6	0.06
	No	57.7	53.3	
Belief that SSB Tax will be Effective				
	Yes	39.4	68.3	<0.001
	No	60.6	38.1	
SSB is Habit Forming or Addictive				
	Neither	16.5	31.2	<0.001
	Addictive	61.3	57.2	
	Habit Forming	22.2	47.1	
Belief in SSB and Obesity Relationship in Children				
	No, do not contribute	11.1	24.2	<0.001
	Yes, only minor cause	36.9	39.9	
	Yes, major cause	51.9	64.8	
Motivation among SSB drinkers to reduce consumption after health expert links SSB with obesity				
	Yes	64.9	59.1	<0.001
	No	35.1	34.7	

<sup>a</sup> P value based on the Pearson's chi square statistic to test the association between respondent characteristics and attitudes toward a state SSB tax adjusting for the sampling design for all characteristics.

**Table 4-3. Odds of supporting a state tax on sugar-sweetened beverages: a US Mid-Atlantic state registered voter sample (n=1,000), February 2013**

Characteristics	<i>n</i>	<i>Model 1</i> Adjusted Odds Ratio (95% CI)	<i>Model 2</i> Adjusted Odds Ratio (95% CI)	<i>Model 3</i> Adjusted Odds Ratio (95% CI)
Age, years				
18 to 34 vs. 35+	946	1.30 (0.75, 2.25)	1.34 (0.74, 2.44)	1.27 (0.62, 2.60)
Gender				
Male vs. Female	946	0.68 (0.48, 0.98)*	0.73 (0.50, 1.06)	0.70 (0.43, 1.13)
Race/Ethnicity				
White	618	Ref.	Ref.	Ref.
African-American/Black	196	1.09 (0.70, 1.70)	1.15 (0.70, 1.87)	1.50 (0.82, 2.75)
Other	87	1.15 (0.66, 2.01)	1.05 (0.57, 1.94)	1.20 (0.55, 2.61)
Political Party				
Democrat	530	Ref.	Ref.	Ref.
Republican	256	0.35 (0.22, 0.56)*	0.35 (0.22, 0.57)*	0.55 (0.30, 0.99)*
Independent or Other	160	0.49 (0.30, 0.79)*	0.45 (0.27, 0.75)*	0.45 (0.23, 0.89)*
Education				
High School or Less	241	Ref.	Ref.	Ref.
Some College/Associate's Degree	218	1.69 (1.02, 2.80)*	1.62 (0.96, 2.71)	1.69 (0.89, 3.21)
4-Year College/Bachelor's Degree	247	1.68 (1.01, 2.78)*	1.60 (0.95, 2.71)	1.35 (0.70, 2.61)
Post-Graduate	206	2.05 (1.17, 3.59)*	1.88 (1.05, 3.37)*	1.50 (0.71, 3.16)
Income, annual before taxes				
≥\$100,000	218	Ref.	Ref.	Ref.
\$50,000 to <\$100,000	260	0.88 (0.58, 1.36)	0.94 (0.60, 1.47)	0.98 (0.56, 1.73)
<\$50,000	180	1.14 (0.68, 1.92)	1.10 (0.64, 1.89)	1.36 (0.68, 2.72)
Daily SSB Consumption				
Yes vs. No	946	---	0.53 (0.34, 0.84)*	0.64 (0.38, 1.07)
SSBs at Home				
Yes vs. No	946	---	0.73 (0.50, 1.09)	0.71 (0.44, 1.14)
Health Care Provider Suggested Weight Loss				
Yes vs. No	911	---	0.64 (0.44, 0.92)*	0.79 (0.50, 1.25)
SSB is Habit Forming or Addictive				
Neither	151	---	Ref.	Ref.

Addictive	562	---	2.27 (1.38, 3.73)*	0.96 (0.48, 1.95)
Habit Forming	188	---	1.97 (1.09, 3.56)*	1.32 (0.62, 2.81)
Belief that SSB Tax will be Effective				
Yes vs. No	890	---	---	2.78 (1.69, 4.57)*
Belief in SSB and Obesity Relationship in Children				
No, do not contribute	97	---	---	Ref.
Yes, only minor cause	316	---	---	1.44 (0.61, 3.36)
Yes, major cause	464	---	---	2.80 (1.14, 6.79)*
Motivation among SSB drinkers to reduce consumption after health expert links SSB with obesity				
Yes vs. No	799	---	---	1.31 (0.78, 2.21)
Childhood Obesity Concern				
Yes vs. No	946	----	---	1.09 (0.56, 2.13)
Childhood Obesity Solution				
Societal Concern vs. Parental Concern	912	----	---	2.84 (1.74, 4.64)*
<b>Model Fit Statistics</b>				
Akaike's Information Criterion		871.3	817.5	568.6
Hosmer-Lemeshow, p-value		0.21	0.45	0.20
F-adjusted mean residual goodness-of-fit test, p-value		0.43	0.62	0.01

\*Indicates a p-value <0.05.

**Table 4-4. Odds of finding any sugar-sweetened beverage consumption or pro-tax message convincing: a US Mid-Atlantic state registered voter sample (n=1,000), February 2013**

		Panel A: Convinced By Any Sugar-Sweetened Beverage Consumption Messages		Panel B: Convinced By Any Pro-Tax Messages	
Characteristics		<i>n</i> ( <i>n</i> =500)	Adjusted Odds Ratio (95% CI)	<i>n</i> ( <i>n</i> =500)	Adjusted Odds Ratio (95% CI)
Age, years					
	18 to 34 vs. 35+	486	3.27 (0.43, 25.0)	494	2.17 (0.77, 6.09)
Gender					
	Male vs. Female	486	0.34 (0.13, 0.91)*	494	1.97 (0.95, 4.09)
Race/Ethnicity					
	White	310	Ref.	325	Ref.
	African-American/Black	101	3.48 (0.93, 13.1)	99	1.60 (0.63, 4.05)
	Other	50	1.34 (0.23, 7.72)	44	1.18 (0.40, 3.47)
Political Party					
	Democrat	273	Ref.	276	Ref.
	Republican	133	3.58 (0.93, 13.82)	129	0.80 (0.30, 2.13)
	Independent or Other	80	18.3 (1.45, 230.9)*	89	0.63 (0.26, 1.52)
Education					
	High School or Less	121	Ref.	128	Ref.
	Some College/Associate's Degree	121	0.86 (0.27, 2.72)	107	0.72 (0.29, 1.83)
	4-Year College/Bachelor's Degree	116	3.00 (0.36, 25.0)	138	1.03 (0.37, 2.84)
	Post-Graduate	110	1.41 (0.33, 6.1)	103	1.11 (0.36, 3.49)
Income, annual before taxes					
	≥\$100,000	102	Ref.	122	Ref.
	\$50,000 to <\$100,000	136	0.25 (0.06, 0.99)*	134	0.79 (0.34, 1.84)
	<\$50,000	91	0.49 (0.09, 2.59)	94	1.12 (0.40, 3.13)
Daily SSB Consumption					
	Yes vs. No	486	1.33 (0.44, 4.07)	494	0.69 (0.32, 1.48)
SSBs at Home					
	Yes vs. No	486	0.54 (0.19, 1.53)	494	0.99 (0.51, 1.95)
Health Care Provider Suggested Weight Loss					
	Yes vs. No	467	1.11 (0.42, 2.92)	476	0.51 (0.26, 0.99)*

SSB is Habit Forming or Addictive					
Neither	80	Ref.	75	Ref.	
Addictive	292	1.69 (0.56, 5.12)	291	1.99 (0.71, 5.60)	
Habit Forming	95	2.71 (0.54, 13.5)	102	1.49 (0.50, 4.50)	
Belief that SSB Tax will be Effective					
Yes vs. No	457	3.98 (0.84, 18.8)	465	6.21 (2.95, 13.1)*	
Belief in SSB and Obesity Relationship in Children					
No, do not contribute	49	Ref.	52	Ref.	
Yes, only minor cause	170	1.09 (0.23, 5.15)	163	1.01 (0.35, 2.96)	
Yes, major cause	236	0.96 (0.16, 5.59)	240	0.92 (0.31, 2.72)	
Motivation among SSB drinkers to reduce consumption after health expert links SSB with obesity					
Yes vs. No	420	3.13 (1.29, 7.56)*	404	1.99 (0.91, 4.39)	
Childhood Obesity Concern					
Yes vs. No	486	4.50 (1.62, 12.53)*	494	1.38 (0.91, 4.39)	
Childhood Obesity Solution					
Societal Concern vs. Parental Concern	466	1.39 (0.33, 5.85)	475	1.80 (0.88, 3.71)	
Model Fit Statistics					
Akaike's Information Criterion		178.3		299.1	
Hosmer-Lemeshow, p-value		0.31		0.47	
F-adjusted mean residual goodness-of-fit test, p-value		0.00		0.09	

\*Indicates a p-value <0.05.

## **List of appendices**

**Appendix 4-1. Respondent characteristics in a US Mid-Atlantic state registered voter sample compared to the overall state population**

**Appendix 4-2. Respondent characteristics examined in analysis of support for a sugar-sweetened beverage (SSB) tax, SSB consumption messages, and pro-tax messages**

**Appendix 4-1. Respondent characteristics in a US Mid-Atlantic state registered voter sample compared to the overall state population**

Characteristics	Overall Unweighted Sample ( <i>n</i> =1,000) %	Overall Weighted Sample ( <i>n</i> =1,000) <sup>a</sup> %	Comparison with State Population <sup>b</sup>
Age, years			
35 and older	90.5	83.7	54.1
18 to 34	9.5	16.3	23.3
Gender			
Female	60.1	52.4	51.3
Male	39.9	47.6	48.7
Race/Ethnicity			
White	68.0	62.4	59.8
African-American/Black	21.7	25.5	29.8
Other (Hispanic, Asian, Multiracial)	10.4	12.1	10.4
Political Party			
Democrat	56.3	55.6	55.7
Republican	26.5	24.9	25.9
Independent or Other	17.2	19.5	18.3
Education			
High School or Less	26.7	24.7	31.4
Some College/Associate's Degree	23.8	24.8	20.4
4-Year College/Bachelor's Degree or Post-Graduate	49.5	50.5	29.5
Income, annual before taxes			
≥\$50,000	72.8	75.3	67.6
< \$50,000	27.2	24.7	32.4

<sup>a</sup> The descriptive data provided are weighted to account for the survey sampling design.

<sup>b</sup> Comparison data for age, gender, race/ethnicity, education, and income from the 2013 Current Population Survey, Annual Social and Economic Supplement and the 2012 Current Population Survey, Annual Voter and Registration Supplement <sup>(35, 43)</sup>.

**Appendix 4-2. Respondent characteristics examined in analysis of support for a sugar-sweetened beverage (SSB) tax, SSB consumption messages, and pro-tax messages**

Characteristics	Survey Question Description	Operationalization of Variables
Opinion of SSB Tax	If health experts proposed adding a tax of one penny per ounce to the price of regular soda and other drinks with added sugar for the purpose of reducing teen consumption and preventing childhood obesity, would you favor or oppose that?	<ul style="list-style-type: none"> <li>• Favor</li> <li>• Oppose</li> </ul>
Age	Retrieved from Voter Registration	<ul style="list-style-type: none"> <li>• 18 to 34 years</li> <li>• 35 years or over</li> </ul>
Gender	Self-Reported in Survey	<ul style="list-style-type: none"> <li>• Male</li> <li>• Female</li> </ul>
Race/Ethnicity	Self-Reported in Survey	<ul style="list-style-type: none"> <li>• White</li> <li>• African-American/Black</li> <li>• Other (Hispanic, Asian, Multiracial, Other)</li> </ul>
Political Party	Retrieved from Voter Registration	<ul style="list-style-type: none"> <li>• Democrat</li> <li>• Republican</li> <li>• Independent or Other</li> </ul>
Education	Self-Reported in Survey	<ul style="list-style-type: none"> <li>• High School or Less</li> <li>• Some College/Associate's Degree</li> <li>• 4-Year College/Bachelor's Degree</li> <li>• Post-Graduate</li> </ul>
Income – 2012 annual income before taxes	Self-Reported in Survey	<ul style="list-style-type: none"> <li>• ≥\$100,000</li> <li>• \$50,000 to &lt;\$100,000</li> <li>• &lt;\$50,000</li> </ul>
Daily SSB Consumption	<p>I am going to read several kinds of drinks. For each one, please tell me if you drink it frequently – meaning at least once a day, occasionally – meaning at least once a week, rarely – meaning less than once a week, or never. The SSB definition included regular soda, sugar-sweetened iced tea, sports drinks, energy drinks, or fruit drinks.</p> <ul style="list-style-type: none"> <li>• Daily SSB Consumption – at least one daily consumption of regular soda, sugar-sweetened iced tea, sports or energy drinks, or sugar-sweetened</li> </ul>	<ul style="list-style-type: none"> <li>• Yes</li> <li>• No</li> </ul>



	fruit drinks.	
SSBs at Home	Respondent reported having one or more type of SSBs in the home, including regular soda, sugar-sweetened iced tea, sports drinks, energy drinks, or fruit drinks. 100% fruit juice and diet drinks were not considered SSBs.	<ul style="list-style-type: none"> <li>• Yes</li> <li>• No</li> </ul>
Health Care Provider Suggested Weight Loss	Have you ever been told by a healthcare professional that you should lose weight?	<ul style="list-style-type: none"> <li>• Yes</li> <li>• No</li> </ul>
SSB is Habit Forming or Addictive	Do you think that sugary drinks are addictive? ( <i>If initially no or not sure</i> ): Do you think they are habit-forming?	<ul style="list-style-type: none"> <li>• Neither Addictive or Habit Forming</li> <li>• Addictive</li> <li>• Habit Forming</li> </ul>
Belief that SSB tax will be Effective	In general, do you think that making sugary drinks more expensive would help cut down on their consumption?	<ul style="list-style-type: none"> <li>• Yes</li> <li>• No</li> </ul>
Belief in SSB and Obesity Relationship in Children	Some of the drinks we discussed have sugar added. They include regular sodas, flavored waters, fruit drinks, sports drinks, and energy drinks. We will call this whole class of drinks “sugary drinks.” Do you think there is a connection between children drinking sugary drinks - like soda - and childhood obesity? ( <i>If yes</i> ): Are sugary drinks a major cause or only a minor cause of childhood obesity?	<ul style="list-style-type: none"> <li>• No, do not contribute</li> <li>• Yes, only minor cause</li> <li>• Yes, major cause</li> </ul>
Motivation among SSB drinkers to reduce consumption after health expert links SSB with obesity	If health experts said sugary drinks are a <u>major</u> cause of obesity or weight gain in general, would that strongly motivate you to drink fewer sugary drinks, motivate you a little bit, or not really motivate you?	<ul style="list-style-type: none"> <li>• Yes</li> <li>• No</li> </ul>
Childhood Obesity Important Concern	Is childhood obesity, in other words children being seriously overweight, a very important concern to you personally, a somewhat important concern, a not very important concern, or a not at all important concern to you?	<ul style="list-style-type: none"> <li>• Not very or not at all important</li> <li>• Very or somewhat important</li> </ul>
Childhood Obesity Solution	Which of these is closer to your own view?	<ul style="list-style-type: none"> <li>• More needs to be done by society to reduce or prevent childhood obesity in the state.</li> </ul>

		<ul style="list-style-type: none"> <li>Reducing childhood obesity is mainly a parent's concern.</li> </ul>
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## **CHAPTER 5- PATTERNS AND PREDICTORS OF STATE ADULT OBESITY PREVENTION LEGISLATION ENACTMENT IN US STATES: 2010-2013**

### **Citation:**

**Donaldson EA, Cohen JE, Villanti AC, Kanarek NF, Barry CL, Rutkow L (2015).  
Patterns and Predictors of State Adult Obesity Prevention Legislation Enactment in  
US States: 2010-2013. *Preventive Medicine*, [In Press].**

## **ABSTRACT**

**Objective:** This study examined bill- and state-level factors associated with enactment of adult obesity prevention legislation in US states.

**Methods:** A review of bills in the Rudd Center for Food Policy and Obesity's legislative database identified 487 adult obesity prevention bills, or proposed legislation, introduced between 2010 and 2013. Multilevel models were constructed to examine bill- and state-level characteristics associated with enactment.

**Results:** From 2010-2013, 81 (17%) of obesity prevention bills introduced were enacted across 35 states and the District of Columbia. Bills introduced in 2010 were more likely to be enacted than in 2013 (OR=9.49; 95% CI: 2.61-34.5). Bills focused on access to healthy food, physical activity, general and educational programs, as well as modifying rules and procedures (e.g., preemption) had greater odds of enactment relative to food and beverage taxes (OR=8.18; 95% CI: 2.85-23.4 healthy food; OR=17.3; 95% CI: 4.55-65.7 physical activity; OR=15.2; 95% CI: 4.80-47.9 general OR=13.7; 95% CI: 3.07-61.5 rules).

**Conclusion:** The year of bill introduction and obesity prevalence were related to adult obesity prevention legislation enactment in states. This study highlights the importance of a bill's topic area for enactment and provides insights for advocates and policymakers trying to address enactment barriers.

## INTRODUCTION

More than two-thirds of US adults are overweight and over one-third are obese.<sup>1</sup> To address this high prevalence rate, state governments can draw on a range of interventions including those emphasizing individual behavior change<sup>2</sup>, as well as population-level strategies, such as legislation.<sup>3-5</sup> State and local governments traditionally have broad legal authority to protect the public's health, and they often rely on legislation and accompanying regulations to accomplish this goal.<sup>9</sup> Legislation is widely used in public health because it has been effective in reducing other behavioral risk factors for disease, such as tobacco use.<sup>6, 8-12</sup> Legislation targeting obesity has, for example, included labeling changes to restaurant menus and trans fat bans.<sup>6, 13</sup>

Previous research summarized childhood obesity prevention legislation and examined state-level predictors of enactment.<sup>14-20</sup> This research, conducted between 2003 and 2009, found that bill topic, sponsorship, and state-level factors such as the political party in power, funding, and obesity prevalence were important for enactment.<sup>14-20</sup> Factors that influence child-focused obesity prevention bill enactment may differ from those that affect bills targeting adults. Two studies explored a dataset of obesity laws aimed at both children and adults between 2001 and 2010.<sup>21, 22</sup> Most enacted bills created a taskforce or involved schools.<sup>21</sup> States with a higher percentage of Hispanic and African American residents were more likely to enact legislation.<sup>22</sup>

Given that the policy landscape may have changed since 2010 and no study has focused exclusively on legislation targeting adults, the current study describes patterns of adult obesity prevention legislation and examines bill-level and state-level correlates of enactment in US states between 2010 and 2013. Based on prior research, it was

hypothesized that the topic area of a bill would be associated with enactment.<sup>14, 17</sup> In addition, it was anticipated that state-level variables, such as the state having a single dominant political party (e.g. governor and state legislature majority are Democrats), would be associated with enactment.<sup>17</sup> Lastly, state-level obesity prevalence was expected to be inversely associated with enactment.

## **METHODS**

The Rudd Center for Food Policy and Obesity's legislative database was used to identify obesity prevention bills introduced in all US states between January 1, 2010 and December 31, 2013.<sup>23</sup> This database contains obesity prevention bills captured by a search strategy using Capital Watch.<sup>24, 25</sup> In the current study, the full text of all bills in the database was reviewed (n=1,053) for the study period. Bills were excluded based on several criteria (**Appendix 5-1**). Fifty-four bills were excluded because they did not focus on prevention. Four hundred forty-four bills were excluded because they focused on children. Childhood laws differ from adult laws by their focus solely on children, including school policies such as increasing exercise during the school day. Adult and childhood laws are not mutually exclusive as a tax could modify parental behavior in a way that influences children. Sixty-one bills were companion bills, such that the same bill was proposed in both of a state's legislative chambers and had identical text. Among companion bills, the bill that made it the furthest in the legislative process was retained. If they were in the same stage of the process, the House bill was retained. Seven bills were removed because they focused on the local, rather than state, level. The final sample included 487 bills.

### *Bill-level variables*

Bill-level variables were coded by a study author (ED) after a review of the complete bill text. The variables are described in detail in **Appendix 5-2**. The primary outcome of interest was enactment status, included as a binary variable. A bill was considered “enacted” if it was passed by the state legislature and was signed into law by the governor.

The primary predictor of interest was the bill topic, included as a categorical variable. One of eight mutually exclusive topics was assigned and when a bill addressed more than one topic, the topic that best fit the overall bill objectives was assigned. The eight topics were: access to healthy food (e.g., fresh fruit and vegetable subsidies); marketing, advertising and menu labeling (e.g., providing calorie information on restaurant menus); food and beverage taxes; access to unhealthy foods (e.g., banning trans fats); physical activity (e.g., bike paths); general and educational (e.g., public education campaigns); modifying rules and procedures (e.g., state-level preemption of localities from enacting stronger menu labeling laws); and other. Bills in the “other” category were excluded in the main analyses of the study. Findings were qualitatively similar in a sensitivity analysis that included this category.

Bills in the sample were also assigned a sector of the food system that they would likely affect including: food production; food processing and distribution; marketing and advertising; retail; restaurants and food service; infrastructure and planning; sports and recreation; multiple sectors; other. Categorizing bills according to food sector was informed by the work of Sacks et al. (2009) and Lyn et al. (2013), which conceptualized the system surrounding food policy.<sup>26,27</sup> Additional information for each bill was coded

including the political party of the bill's primary sponsor (i.e. Democrat, Republican, or Other), whether the bill had a companion bill, and the year in which the last action (e.g., veto, signed into law) for the bill occurred.

### *State-level variables*

The state-level variables explored in this study concern the political, health, and sociodemographic characteristics of the state. The total number of state bills introduced and enacted of any type, not just bills focused on obesity, was recorded for legislative sessions between 2010 to 2013 using the StateNet database.<sup>28</sup> The average state enactment rate was calculated with this information by averaging the proportion of all bills enacted out of the total introduced in the state legislative sessions from 2010 to 2013. In addition, a variable reflecting the proportion of adult obesity prevention bills introduced out of the total bills introduced in the legislature was created.

Additional state characteristics included the political party of the governor and state legislature: Democrat, Republican, Other. The political parties in power were assessed in each legislative session from 2010 through 2013.<sup>28</sup> A binary variable compared states with one dominant political party (e.g. governor and both legislative chambers were Democrats) to those with a divided government because a dominant party may indicate a reduced likelihood of veto.<sup>29</sup> Legislative session frequency (annual or biannual) was coded.<sup>28</sup>

Other state-level characteristics considered were the average proportion of the state's population living in poverty, completing a bachelor's degree or higher, or not completing high school between 2010 and 2013. These variables, as well as the average



proportion of the state's population that was non-White, were obtained from the Current Population Survey.<sup>30</sup> The 2012 state adult obesity prevalence and the absolute change in the proportion of obese adults between 1997 and 2010 were included from the Behavioral Risk Factor Surveillance System.<sup>31</sup> This thirteen year period was selected because it was a period of great change in US obesity rates.<sup>31</sup> Obesity was defined as a body mass index greater than or equal to 30 kg/m<sup>2</sup>.<sup>31</sup> Lastly, bill enactment by US region was explored based on Census Bureau classification.<sup>40</sup>

### *Statistical analysis*

The difference in the proportion of bills enacted by bill-level characteristic was examined using the chi-square statistic. Simple logistic regressions with a random-intercept were fit for each bill- and state-level variable. The continuous state-level variables retained in the final model were split at their median and included as binary variables. Variable selection was informed by the approach of Hosmer and Lemeshow<sup>32</sup> and used in previous research<sup>14</sup> which considered variables for the final model based on a priori hypotheses and those with a p-value <0.05 in the simple regression models.

In the multivariable analyses, a hierarchical model with a random intercept and no covariates was fit to estimate the overall average enactment across states. Multivariable models were fit with one extending the random intercept model to include bill-level variables and the second extending it further to include state-level variables. Multicollinearity was assessed and a bill's food sector (e.g., retail), was highly collinear with the bill topic (e.g., taxes). Therefore, only bill topic was retained. The variance of the state-specific random intercepts was compared between the models. Goodness-of-fit

was assessed with Akaike's Information Criterion. All analyses were conducted using Stata 11.<sup>33</sup>

## RESULTS

Overall, from 2010 to 2013, 81 of the 487 bills introduced (16.6%) were enacted in 36 jurisdictions, including the District of Columbia. **Figure 5-1** illustrates the bill introduction and enactment patterns, ranging from 71 bills introduced in New York to no bills introduced in Montana or Wyoming. (See **Appendix 5-3** for additional details regarding the number of bills introduced and enacted by state). In exploring bill enactment by US region, Western states had the highest enactment (28.2%), followed by the South (16.9%), the Midwest (12.7%) and the Northeast (8.9%).

**Table 5-1** shows the frequency of bills introduced and enacted by bill-level characteristic, including those for which enactment differed significantly. Sixty-two percent of bills were introduced by a Democratic sponsor. However, a greater proportion of Republican-sponsored bills were enacted compared to those introduced by Democrats and Others (24%, 13%, and 20%, respectively;  $p$ -value  $<0.05$ ). A greater proportion of bills were enacted in 2010 (42%) compared to later years; however, only 38 bills were introduced in 2010 as compared to more than 100 introduced in 2011, 2012, and 2013. (See **Appendix 5-4** for an illustration of bill enactment by topic area for each year in the study period). Most bills focused on diet; however, a significantly greater proportion of physical activity bills were enacted relative to diet (37%, 13%, respectively;  $p$ -value  $<0.001$ ). The bills varied with regard to the obesity prevention topic they addressed. The most prevalent topics were food and beverage taxes and access to healthy food, with the

fewest bills introduced that modified rules and procedures or focused on physical activity. Enactment differed by bill topic (p-value <0.001). Bills focused on physical activity and modifying rules and procedures had the highest proportion of enactment relative to the other topics (43% and 37%, respectively). The food and beverage tax category was among the topics with the lowest proportion of bills enacted (8%). The food system sector that the bill would operate within was varied, with most focused on the retail or food processing and distribution sectors. However, enactment differed by sector, with the highest proportion of enactment among infrastructure bills (42%; p-value <0.001).

State legislatures varied in regard to the number of bills introduced and enacted overall from 2010 to 2013, regardless of a focus on obesity prevention (**Table 5-2**). The average enactment rate for all bills introduced in state legislatures was 23.3% between 2010 and 2013, ranging from 5% in Minnesota to 77% in Arkansas. Bills focused on adult obesity prevention made up a very small proportion (0.2%) of the total bills introduced.

The three fitted multivariable hierarchical models with random intercepts are summarized in Table 3. The intercept-only model illustrates that the overall odds of enactment across states was 0.19 (95% CI: 0.12-0.29). In the second model, extended to include bill characteristics, year was a significant predictor with bills considered in 2010 having 8 times the odds of enactment compared to bills in 2013 (OR=8.10; 95% CI: 2.50-26.3). Compared to taxes, bills were more likely to be enacted if they focused on access to healthy food, physical activity, general and educational programs, or changing legislative rules and procedures.

In the third model, year and bill topic remained significant predictors in this model after adjustment for bill and state covariates. Bills concerning access to healthy food, physical activity, general and educational programs, as well as modifying rules and procedures had over 8 times the odds of enactment compared to food and beverage taxes (OR= 8.18; 95% CI: 2.85-23.4 healthy food; OR= 17.3; 95% CI: 4.55-65.7 physical activity; OR= 15.2; 95% CI 4.80-47.9 general OR= 13.7; 95% CI: 3.07-61.5 rules). The average enactment rate between 2010 and 2013 of any type of bill (i.e., obesity or other) was related to obesity prevention bill enactment. States with greater than 20% average bill enactment had 3 times the odds of enacted obesity prevention bills compared to states with lower an average enactment rate (OR= 3.07; 95% CI: 1.24-7.60). Lastly, in exploring the variation explained by the models, the standard deviation of the state-specific intercept decreased when the state characteristics were included.

## **DISCUSSION**

The current study examined bill- and state-level factors associated with enactment of adult obesity prevention legislation in US states between 2010 and 2013. The enactment rate observed in this study (17%) was similar to two studies that found a 17% obesity law enactment rate from 2003 to 2005<sup>17</sup> and 15% from 2001 to 2010.<sup>21</sup> Adult obesity legislation enactment was lower compared to the average rate of enactment (23%) for state legislation overall.

In exploring the factors associated with enactment, this study found that a bill's topic was important for enactment in this and previous studies.<sup>14, 17</sup> Legislation that initiated farmer's markets, increased access to walking trails, created obesity task forces,

and allowed a state to preempt local menu labeling was more likely to be enacted relative to soda taxes.<sup>14, 17</sup> Legislation patterns observed may reflect public support for these laws, as well as challenges in moving them through the legislative process. For example, although enactment was low, taxes were introduced more often than bills in other topic areas from 2010 to 2013, which could indicate increased interest in this approach.

If policymakers and advocates are aware that the topic matters, it could help them in drafting feasible bills. Bills that restrict, such as food and beverage taxes, were less likely to be enacted relative to bills that added a choice by increasing access to healthy foods or built environment changes like building bike paths. A feasible bill, however, is not necessarily the same as one that may reduce obesity. Therefore, as evidence emerges about effective strategies that are less politically feasible, proponents could consider the current findings that bills involving a restriction were less likely to be enacted than those adding a new option. Future research should explore whether framing a proposed bill to emphasize its contributions to the environment or combining a restriction with a new choice influences passage, such as a soda tax that funds farmer's markets.

In exploring political characteristics, the bill sponsor's political party and the party in control of the state legislature were not important factors for enactment in contrast to other studies.<sup>14, 15, 17</sup> However, states with a higher overall enactment rate were more likely to enact adult obesity prevention legislation. These findings are useful for advocates considering whether a particular state may be more amenable to a policy proposal based on the overall productivity of a state's legislature.

Most of the state health and demographic characteristics were not associated with enactment. In contrast to the hypothesis, but similar to previous research,<sup>14</sup> this study

found that obesity prevalence in 2012 was not associated with enactment. These findings may reflect limited variation in the current prevalence and change over the past decade. Alternatively, legislators may not consider obesity prevalence when making decisions because all states experienced a substantial increase.

Overall, in comparison to the level of childhood obesity prevention legislation introduction and enactment,<sup>14, 15</sup> adult obesity prevention legislation is enacted at lower rates. Enacting adult obesity legislation may warrant consideration of the legislative topics that have been successful and the reasons why certain topics are more difficult to enact. However, it may be that regardless of the topic, state legislation is a less feasible approach relative to local laws, particularly if localities are not preempted from enacting strong laws, as illustrated by the uptake of local smoke-free laws.<sup>34</sup> Furthermore, decision makers may be less supportive of legislation if they think their constituents view obesity as an individual's responsibility.<sup>35-37</sup> A national poll in 2013 found that despite thinking that the obesity has societal consequences most people do not support government interventions like legislation.<sup>38</sup> Additionally, a survey of state legislators found that perceiving obesity as serious societal issue was associated with obesity prevention policy support.<sup>39</sup> The current study offers a starting point and further research is warranted to understand barriers to enacting certain topics, such as taxes. For example, qualitative research may be useful to explore the legislative process as adult obesity prevention bills are considered.

### *Limitations*

The current study has several limitations. First, bills were retrieved from a publically available database and the study authors were not involved in the search to populate this database. Therefore, this study may have missed some bills given that the database may have excluded bills that were of unknown relevance to this analysis. Second, bill characteristics were coded by one person; therefore, reliability could be of concern. Third, the analysis was limited to state legislation and may underestimate total action by not including local laws, regulations, litigation, executive orders, and community interventions. Fourth, the characteristics selected were based on childhood obesity legislation enactment which may differ from adult legislation in important and unexplored ways, resulting in this analysis omitting important variables. Fifth, bills in this study covered a range of approaches. For example, the food and beverage tax category included both proposed vending tax increases as well as tax exemptions. A sensitivity analysis was conducted and separating bills with potentially differing effect did not change the analysis. Sixth, New York was an outlier in terms of typical state enactment of bills of any type, as well as introduction of obesity prevention bills. A sensitivity analysis was conducted and excluding New York did not alter the analysis.

### *Conclusion*

Legislation is one approach used widely as a public health strategy to modify the environment in ways that facilitate and impede behavior. As illustrated, bills introduced to address adult obesity can range from healthy food access to infrastructure changes. The legislation topic was associated with enactment such that advocates and researchers

should consider why some bills were more successful in being passed compared to others. However, feasibility of enactment is only one consideration in deciding what legislation to pursue. The law's potential effectiveness in modifying obesity risk factors is also critical for stemming the epidemic. Given the relatively small number of laws that have been enacted, opportunities to evaluate their effect are limited. Therefore, this study offers a first step in understanding enactment patterns to guide future advocacy efforts and to inform research on the legislative process.



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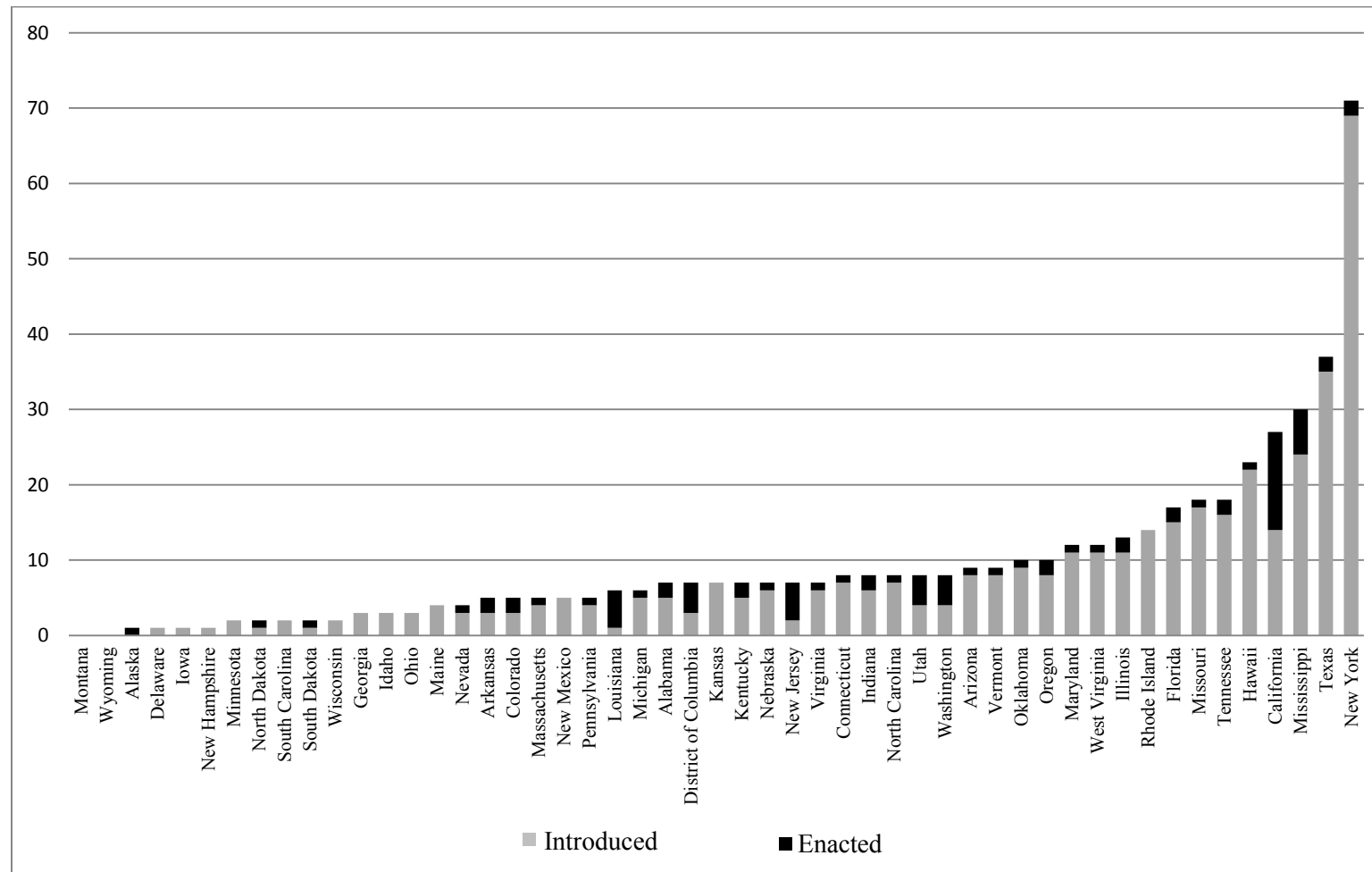
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## Tables and figures

**Figure 5-1. Number of Adult Obesity Prevention Bills Introduced and Enacted by State, 2010-2013**



*Note:* Enactment of a bill or resolution indicates that it was passed into law on or before December 31, 2013.

**Table 5-1. Frequencies of Bill-Level Variables: State Adult Obesity Prevention Bills, 2010-2013**

<b>Variables</b>		<b>Introduced No.</b>	<b>Enacted<sup>a</sup> No. (% of introduced)</b>
<b>Overall</b>		<b>487</b>	<b>81 (16.6)</b>
Sponsor Party*			
	Democrat	302	39 (12.9)
	Republican	131	31 (23.7)
	Committee/Ballot/Other	54	11 (20.4)
Companion Bill			
	Yes	61	14 (23)
	No	426	67 (15.7)
Year Considered*			
	2010	38	16 (42.1)
	2011	173	30 (17.3)
	2012	131	19 (14.5)
	2013	145	16 (11.0)
Overall Category*			
	Diet/Nutrition	387	52 (13.4)
	Physical Activity	38	14 (36.8)
	Both/ General	62	15 (24.2)
Bill Topic*			
	Food and Beverage Taxes	128	10 (7.8)
	Access to Healthy Food	113	27 (23.9)
	Marketing, Advertising, and	75	5 (6.7)
	Menu labeling		
	General and Educational	67	18 (26.9)
	Access to Unhealthy Foods	49	0 (0)
	Physical Activity	30	13 (43.3)
	Modifying Rules and	19	7 (36.8)
	Procedures		
	Other	6	1 (16.7)
Food System Sector*			
	Retail	177	17 (9.6)
	Food Processing and Distribution	114	20 (17.5)
	Restaurants and Food Service	59	6 (10.2)

Multiple	35	11 (31.4)
Marketing and Advertising	28	2 (7.1)
Infrastructure and Planning	24	10 (41.7)
Other	19	6 (31.6)
Food Production	17	5 (29.4)
Sports and Recreation	14	4 (28.6)

<sup>a</sup> Enactment of a bill or resolution indicates that it was passed into law on or before December 31, 2013.

\*Indicates that enactment differs significantly by the bill-level characteristic, p-value <0.05.

**Table 5-2. Frequencies of State-Level Variables: State Adult Obesity Prevention Bills, 2010-2013**

<b>Variables State-Level (n=49)</b>	<b>No.</b>
No. Bills Introduced in State Legislature, mean (SD)	12,486 (11,327)
No. Bills Enacted in State Legislature, mean (SD)	1,957 (1,338)
Average % Enactment in State Legislature, mean (SD)	23.3 (16.4)
% Obesity Prevention Bills of Total Introduced in State Legislature, mean (SD)	0.2 (0.1)
No. Obesity Prevention Topic Areas Introduced, mean (SD)	5.13 (1.5)
Legislature Session Frequency, %	
<i>Yearly Session</i>	91.2
<i>Legislature Meets Every Other Year</i>	8.8
Governor Political Party, %	
<i>Democrat</i>	52.7
<i>Republican</i>	44.4
<i>Independent</i>	2.9
House Majority Political Party, %	
<i>Democrat</i>	53.5
<i>Republican</i>	45.4
<i>Tie</i>	1.1
Senate Majority Political Party, %	
<i>Democrat</i>	52.6
<i>Republican</i>	44.4
<i>Tie</i>	2.9
Legislature and Executive Political Party	
<i>All Same Party</i>	78.9
<i>Legislature Same and Governor Differs in Party</i>	16.1
<i>One House of Legislature and Governor Same</i>	4.9
% Obese (BMI $\geq 30$ kg/m <sup>2</sup> ) 2012, mean (SD)	27.6 (3.7)
Change in % Obese (BMI $\geq 30$ kg/m <sup>2</sup> ) 1997- 2010, mean (SD)	10.8 (2.2)
Average % State Population Living in Poverty 2010 to 2013, mean (SD)	15.3 (2.9)
Average % State Population Covered by Medicaid 2010 to 2013, mean (SD)	17.1 (3.7)
Average % State Population Bachelor's Degree or Higher 2010 to 2013,	21.4 (4.6)



mean (SD)	
Average % State Population High School Non-Completion 2010 to 2013, mean (SD)	14.2 (2.3)
Average % Non-White State Population 2010 to 2013, mean (SD)	24.8 (15.6)

**Table 5-3. Multilevel Model Results: Bill-Level and State- Level Predictors of Adult Obesity Prevention Bill Enactment, 2010-2013**

	<b>Model 1: extended to include bill-level variables</b>	<b>Model 2: extended further to include state-level variables<sup>a</sup></b>
	<b>Odds Ratio (95% CI)</b>	<b>Odds Ratio (95% CI)</b>
Intercept	0.02 (0.01, 0.08)	0.01 (0.00, 0.07)
<b><i>Bill-Level Variables</i></b>		
Sponsor Party		
Democrat	Ref.	Ref.
Republican	2.07 (0.97, 4.41)	1.98 (0.91, 4.32)
Committee/Ballot/Other	0.82 (0.28, 2.44)	0.78 (0.25, 2.46)
Companion Bill (Yes vs. No)	1.97 (0.81, 4.82)	2.02 (0.82, 4.97)
Year Considered		
2013	Ref.	Ref.
2012	0.93 (0.36, 2.39)	1.04 (0.41, 2.65)
2011	2.01 (0.88, 4.60)	2.07 (0.87, 4.93)
2010	<b>8.10 (2.50, 26.3)</b>	<b>9.49 (2.61, 34.5)</b>
Bill Topic		
Food and Beverage Taxes	Ref.	Ref.
Access to Healthy Food	<b>5.14 (2.01, 13.1)</b>	<b>8.18 (2.85, 23.4)</b>
Marketing, Advertising, and Menu labeling	1.13 (0.32, 3.96)	1.76 (0.47, 6.52)
Access to Unhealthy Foods	0.00 (0.00, ---)	0.00 (0.00, ---)
Physical Activity	<b>11.9 (3.58, 39.6)</b>	<b>17.3 (4.55, 65.7)</b>
General and Educational	<b>9.83 (3.40, 28.4)</b>	<b>15.2 (4.80, 47.9)</b>
Modifying Rules and Procedures	<b>11.1 (2.61, 47.1)</b>	<b>13.7 (3.07, 61.5)</b>
<b><i>State-Level Variables</i></b>		
No. Bills Introduced in State Legislature		
<8,600 (1,111 to 8,581)	-----	Ref.
>8,600 (8,901 to 38,125)	-----	0.68 (0.24, 1.89)

Enactment in State Legislature		
< 20% (4% to 19%)	-----	Ref.
>20% (20% to 77%)	----	<b>3.07 (1.24, 7.60)</b>
Legislature and Executive Political Party		
All Same Party (Ref.)	-----	Ref.
Legislative Branch or Executive Party Differs	-----	0.51 (0.20, 1.32)
Governor Political Party		
Democrat	-----	Ref.
Republican	-----	1.38 (0.56, 3.42)
% State Population Obese (BMI $\geq 30$ kg/m <sup>2</sup> ) 2012		
20.5% to 27.3%	-----	Ref.
27.4% to 34.7%	----	0.72 (0.24, 2.14)
Change in % Obese in State (BMI $\geq 30$ kg/m <sup>2</sup> ) 1997- 2010		
5.5% to 10.7%	-----	Ref.
10.9% to 16.2%		0.54 (0.19, 1.57)
Average % State Population Bachelor's Degree or Higher 2010 to 2013		
14.5% to 21.4%	-----	Ref.
21.8% to 43.6%	-----	1.52 (0.56, 4.18)
Average % Non-White State Population 2010 to 2013		
4.4% to 20.9%	-----	Ref.
21.4% to 79.6%	-----	1.24 (0.50, 3.06)
Tau-squared (sd_cons) <sup>2</sup> = variation between states, the standard deviation of the state-specific intercept	1.06	0.48
AIC	356.0	338.8

Note: Odds ratio estimates in **bold** indicate statistical significance, p-value <0.05.

<sup>a</sup> US region was considered as a third level in the final multivariable model. The findings did not differ from the two-level model.

## **List of appendices**

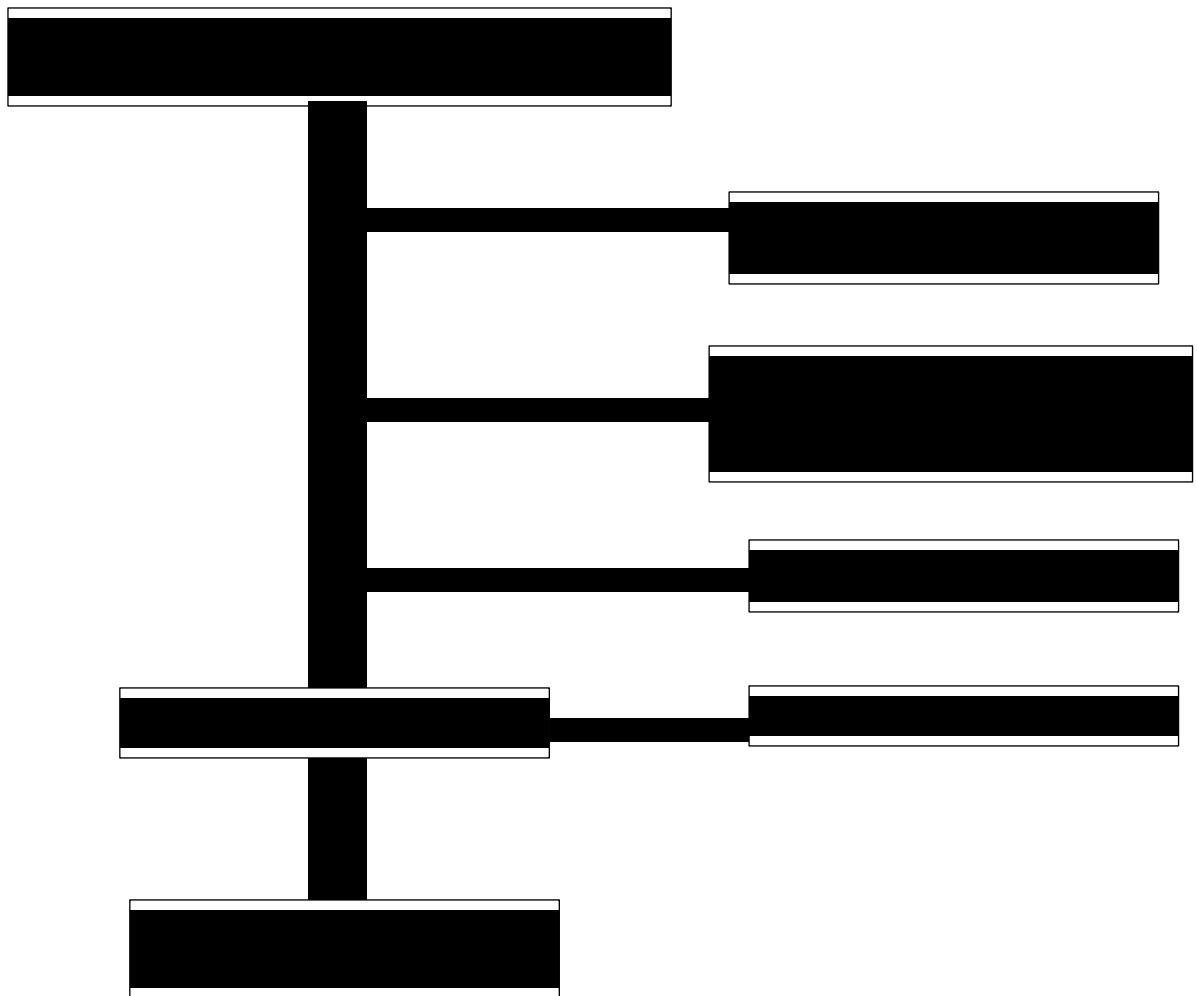
### **Appendix 5-1. Flowchart of Included Adult Obesity Prevention Bills**

### **Appendix 5-2. Bill-Level and State-Level Variables Examined as Predictors of State Adult Obesity Prevention Bill Enactment, 2010-2013**

### **Appendix 5-3. Introduced and Enacted Adult Prevention Obesity Bills by State, 2010-2013**

### **Appendix 5-4. Enacted Adult Obesity Prevention Bills by Topic and Year, 2010-2013**

## Appendix 5-1. Flowchart of Included Adult Obesity Prevention Bills



**Appendix 5-2. Bill-Level and State-Level Variables Examined as Predictors of State Adult Obesity Prevention Bill Enactment, 2010-2013**

Variable	Description		Data Source
<b>Bill-level Variables</b>			
Sponsor Party	Political party of primary bill sponsor.		Yale Rudd Center Database
Companion Bill	A bill that had a companion bill in the State Senate or State House of Representatives.		Coded by ED
Year Considered	The year during which the last action for the bill took place. This could include enactment or being voted against during a Committee hearing.		Yale Rudd Center Database
Overall Category	Diet/Nutrition	The bill focused on diet or nutrition (e.g. increasing the number of farmer's markets, calorie labeling in restaurants).	Coded by ED
	Physical Activity	The bill focused on physical activity (e.g. providing funds for bike lanes).	
	Both/General	The bill focused on either both diet and physical activity or it had a general focus (e.g. a council or task force) with a broad mandate for obesity prevention but without defining specific intervention components.	
Bill Topic	Access to Healthy Food	Bills in this category include tax exemptions on fresh fruits and vegetables, increasing access to healthy foods to vulnerable populations (e.g. increasing healthy options in low-income neighborhoods, community gardens), or increasing access to the population as a whole. This category includes legislative action that addresses food insecurity issues (e.g. expanding eligibility for the Supplemental Nutrition Assistance Program (SNAP)).	Coded by ED
	Marketing, Advertising, and Menu labeling	Bills in this category include expanding the scope of marketing or advertising at a venue (e.g. school bus) or limiting marketing or advertising (e.g. removing toys from kids' meals in restaurants). This category also includes menu and package labeling (e.g. providing calorie information on restaurant menus).	

	Food and Beverage Taxes	Bills in this category include raising or lowering taxes on food and beverages.	
	Access to Unhealthy Foods	Bills in this category include setting nutritional standards regulating the content of a meal or removing an ingredient identified as unhealthy (e.g. removing trans fats from restaurant food items).	
	Physical Activity	Bills in this category include increasing access to recreation spaces (e.g. building new bike paths, trails, or parks).	
	General and Educational	Bills in this category include developing a plan regarding obesity prevention, putting obesity on the agenda, or initiating a council or task force. This also includes efforts that inform or educate the public about dietary and exercise behaviors.	
	Modifying Rules and Procedures	Bills in this category could include any that involve modifying legislative rules or procedures including regulation regarding lawsuits and personal responsibility for weight gain, as well as changing the voting requirements for taxes to require a majority to enact tax change. This category also includes preemption which is defined in this study as legislation that prevents local governments from enacting more restrictive laws than the state government on a particular subject, such as menu labeling or banning trans fats.	
	Other	Bills in this category include ending a council or task force, as well as bills whose intended purpose or area of focus was unclear in the legislation text.	
Food System Sector	Food Production	Bills in this category include legislation for community gardens or modifications to zoning of farm land or other food production locations	Coded by ED
	Food Processing and Distribution	Bills in this category include food transport and safety, as well as access to healthy foods in low income communities (e.g. SNAP expansion, prohibiting specific foods, and waivers). In addition, this category includes bills addressing the density of fresh food or fast food retailers (e.g. food deserts or food swamps).	
	Marketing and	Bills in this category include marketing and advertising healthy or unhealthy	

	Advertising	foods.	
	Retail	Bills in this category include zoning of food retail environments, as well as taxes and packaging and labeling in all types of food retailers (e.g. grocery, restaurants).	
	Restaurants and Food Service	Bills in this category include providing nutrition information in restaurants (e.g. fast food and other food service environments).	
	Infrastructure and Planning	Bills in this category include infrastructure and general land use planning, such as providing alternative transportation (e.g. bike lanes), or adding sidewalks.	
	Sports and Recreation	Bills in this category include increasing access to parks or open spaces, including providing access among the community to school playgrounds.	
	Multiple	Bills in this category meet more than one of the above categories.	
	Other	Bills in this category do not fit into one of the above categories (e.g. a research study on contributors to obesity in a state).	
<b>State-level Variables</b>			
No. Bills Introduced	The number of bills that were introduced on average during the state's legislative sessions between 2010 and 2013.		StateNet Database
No. Bills Enacted	The number of bills that were enacted on average during the state's legislative sessions between 2010 and 2013.		StateNet Database
Average % Enactment in State Legislature	The average for 2010-2013 legislative sessions of the proportion of bills enacted in a state out of the total introduced in the state legislature.		StateNet Database
Range of Topic Areas Introduced	The number of unique policy topic areas covered by state legislative action during the study period.		Coded by ED
% Bills Introduced in State Legislature Focused on Obesity	The proportion of adult obesity prevention bills introduced in a state out of the total bills introduced in the state legislature between 2010-2013.		ED and StateNet Database
Legislature Session Type	Some states meet annually and others meet biannually.		StateNet Database
Governor Political Party	The political party of the governor during the state legislative session that corresponded to the year during		StateNet Database



	which the last action for the bill took place.	
House Majority Political Party	The political party of the house majority during the state legislative session that corresponded to the year during which the last action for the bill took place.	StateNet Database
Senate Majority Political Party	The political party of the senate majority during the state legislative session that corresponded to the year during which the last action for the bill took place.	StateNet Database
Legislature and Executive Political Party	The state government would fall into one of three categories based on the political party of the governor, house majority and senate majority: 1) All three are represented by the same political party; 2) The state legislature is comprised of the same party and the governor's political party differs; 3) One branch of the state legislature's majority party is the same as the governor.	StateNet Database
% Obese (BMI $\geq 30$ kg/m <sup>2</sup> ) 2012	The proportion of obese adults (BMI greater than or equal to 30 kg/m <sup>2</sup> ) based on the 2012 Behavioral Risk Factor Surveillance System.	BRFSS 2012
Change in % Obese (BMI $\geq 30$ kg/m <sup>2</sup> ) 1997-2010	The absolute change in the proportion of obese adults (BMI greater than or equal to 30 kg/m <sup>2</sup> ) between 1997 and 2010 based on the Behavioral Risk Factor Surveillance System.	BRFSS 2012
Average % of the state population living in poverty, 2010 to 2013	The average proportion of the state's population living in poverty between 2010 and 2013 based on the 2013 Current Population Survey. Poverty is defined as a family's income is less than 100% of their assigned poverty threshold. Poverty thresholds take into account the size of the family and the age of family members.	Current Population Survey 2010 to 2013
Average % of the state population that completed a bachelor's degree or more education, 2010 to 2013	The average proportion of the state's population that completed a bachelor's degree or more between 2010 and 2013 based on the 2013 Current Population Survey.	Current Population Survey 2010 to 2013
Average % of the state population that did not complete high school, 2010 to 2013	The average proportion of the state's population that did not complete high school between 2010 and 2013 based on the 2013 Current Population Survey.	Current Population Survey 2010 to 2013
Average % of the state population receiving Medicaid, 2010	The average proportion of the state's population that received Medicaid between 2010 and 2013 based on the 2013 Current Population Survey.	Current Population Survey 2010 to 2013

to 2013		
Average % of the state population that self-reported non-White race/ethnicity, 2010 to 2013	The average proportion of the state's population that self-reported being of non-White race/ethnicity between 2010 and 2013 based on the 2013 Current Population Survey. Race/ethnicity included in this proportion are Black, African American, American Indian or Alaska Native, Asian, Native Hawaiian and other Pacific Islander, and those reporting two or more races.	Current Population Survey 2010 to 2013
<b>Regional Variable</b>		
Region	States contained in four US regions as defined by the US Census Bureau.	US Census Bureau

**Appendix 5-3. Introduced<sup>a</sup> and Enacted<sup>b</sup> Adult Obesity Prevention Bills by State, 2010-2013**

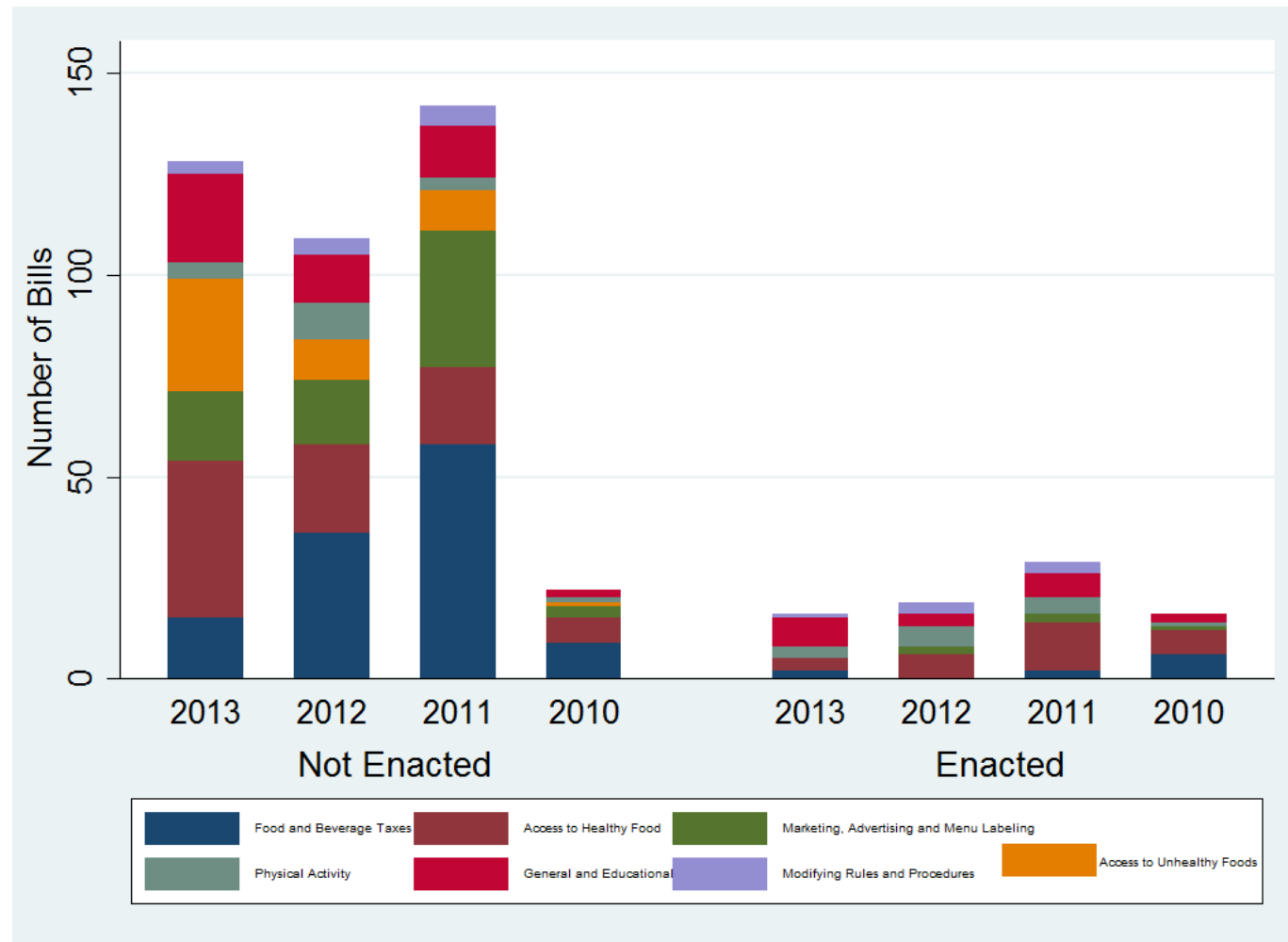
State	Bills (N = 487)	
	Introduced, No.	Enacted, No. (%)
Alabama	7	2 (28.6)
Alaska	1	1 (100.0)
Arizona	9	1 (11.1)
Arkansas	5	2 (40.0)
California	27	13 (48.1)
Colorado	5	2 (40)
Connecticut	8	1 (12.5)
Delaware	1	0 (0.0)
District of Columbia	7	4 (57.1)
Florida	17	2 (11.8)
Georgia	3	0 (0.0)
Hawaii	23	1 (4.3)
Idaho	3	0 (0.0)
Illinois	13	2 (15.4)
Indiana	8	2 (25.0)
Iowa	1	0 (0.0)
Kansas	7	0 (0.0)
Kentucky	7	2 (28.6)
Louisiana	6	5 (83.3)
Maine	4	0 (0.0)
Maryland	12	1 (8.3)
Massachusetts	5	1 (20)
Michigan	6	1 (16.7)
Minnesota	2	0 (0.0)
Mississippi	30	6 (20.0)
Missouri	18	1 (5.6)
Montana	----	---
Nebraska	7	1 (14.3)
Nevada	4	1 (25.0)
New Hampshire	1	0 (0.0)
New Jersey	7	5 (71.4)
New Mexico	5	0 (0.0)
New York	71	2 (2.8)
North Carolina	8	1 (12.5)
North Dakota	2	1 (50.0)
Ohio	3	0 (0.0)
Oklahoma	10	1 (10.0)
Oregon	10	2 (20.0)
Pennsylvania	5	1 (20.0)
Rhode Island	14	0 (0.0)
South Carolina	2	0 (0.0)
South Dakota	2	1 (50.0)
Tennessee	18	2 (11.1)
Texas	37	2 (5.4)

Utah	8	4 (50.0)
Vermont	9	1 (11.1)
Virginia	7	1 (14.3)
Washington	8	4 (50.0)
West Virginia	12	1 (8.3)
Wisconsin	2	0 (0.0)
Wyoming	---	---
<b>Total</b>	<b>487</b>	<b>81 (16.6)</b>

a Bills and resolutions must have been introduced between January 1, 2010 and December 31, 2013 to be included.

b Enactment of a bill or resolution indicates that it was passed into law on or before December 31, 2013.

**Appendix 5-4. Enacted Adult Obesity Prevention Bills by Topic and Year, 2010-2013**



## **CHAPTER 6- DISCUSSION**

## **Discussion of Findings**

The goal of this dissertation was to examine the policy process as legislative and regulatory interventions were considered to reduce obesity and related health outcomes in the US adult population. The dissertation addressed this goal using methods that characterized key features of the policy process - the news media coverage, public opinion, and bill- and state-level characteristics associated with enactment of obesity prevention legislation. This chapter briefly summarizes the findings of each aim and provides a discussion of the dissertation overall, as well as policy and practice implications. In addition, the strengths and limitations of the dissertation, as well as recommendations for future research, are discussed.

### **Aim 1: To assess news media framing of New York City's (NYC) proposed regulation to prohibit the sale of sugar-sweetened beverages over sixteen ounces in size**

This study examined supportive and opposing frames in the news media coverage of the New York City sugar-sweetened beverage (SSB) portion size cap debate from May 31, 2012 to July 31, 2013. The findings indicated that a much larger proportion of news stories had con-policy frames than pro-policy frames with a limited focus on the health benefits of the regulation. Over time, framing seemed to reflect the ongoing legal challenge as pro-policy frames focused more on the policy's effect on special populations and con-frames shifted toward economic, legal, and implementation concerns. The debate's most prominent frame was the con-policy frame that the portion size cap was outside of the government's role.

This study offers the first analysis of news media framing during the consideration, initial passage, and ongoing legal action of the NYC SSB portion size cap policy. Understanding how the news media framed the policy can provide insights for advocates and policymakers in other jurisdictions when considering similar policies and programs.

**Aim 2: To examine the characteristics of supporters and opponents of a state sugar-sweetened beverage (SSB) tax, and to identify pro-tax messages that resonate with the public**

This study examined characteristics of supporters of a SSB tax, pro-tax messages, and SSB consumption reduction messages in a Mid-Atlantic US state. Results show that half of respondents support a penny-per-ounce SSB tax with stronger support among those holding beliefs such as SSBs are a major cause of childhood obesity and a belief that obesity in children warrants a societal intervention. Furthermore, those who believed that a tax would be effective in lowering obesity rates supported the tax proposal. The most popular messages focused on children and obesity without mentioning the tax. The most popular pro-tax messages called for an earmark for childhood obesity prevention in schools and described the tax as a way to counter industry advertising that targets children.

This study assessed a wide range of characteristics associated with SSB tax support in a US state. These findings could help advocates to identify potential coalition members, offer a quick assessment of the political feasibility of similar measures, and inform framing around future tax proposal discussions. In examining support for SSB



consumption and pro-tax messages, the study findings suggest that SSB tax advocates should emphasize a societal solution to obesity, promote the effectiveness of a SSB tax, and highlight the association between SSBs and obesity.

**Aim 3: To examine bill-level and state-level characteristics of adult obesity prevention legislation enactment in US states between 2010-2013**

This study described patterns of obesity prevention legislation focused on adults and examined bill-level and state-level correlates of enactment in US states between 2010 and 2013. Findings indicate that a bill's obesity prevention topic was an important predictor of enactment. Bills focused on access to healthy food, physical activity, general and educational programs, as well as modifying rules and procedures were more likely to be enacted compared to food and beverage taxes. Political and health characteristics of the state were associated with obesity prevention bill enactment. States with a single dominant political party were more likely to enact legislation compared to states where one or both of the legislative branches differ from the governor's political party. Furthermore, although greater obesity prevalence change from 1997 to 2010 was associated with reduced enactment, states with a higher obesity prevalence in 2012 were more likely to enact obesity prevention legislation.

This study contributes to the existing literature on obesity prevention legislation in describing the scope, type, and enactment of adult obesity legislation in the US between 2010 and 2013. It offers an important first step in characterizing adult obesity prevention legislation enactment. The findings provide guidance for policymakers,

advocates, and researchers seeking to identify or address enactment barriers that are malleable like bill topic area.

### **Integrative Summary and Implications for Policy and Practice**

The three studies that comprise this dissertation examine framing, public opinion, and legislation characteristics during different stages of the policy process, including policy proposal and enactment. They examine external and internal factors affecting policy change and contribute novel evidence on the barriers and facilitators to enacting and implementing obesity prevention policy interventions. Overall, the studies found that there was a general consensus that the obesity epidemic warrants a response. However, legislation was not a uniformly popular approach. Additionally, perceptions of the role of government in protecting the public's health were varied and influenced support for a policy approach to prevent and control adult obesity.

The dissertation illustrates that concern for obesity is accompanied by less public support and political will for certain proposed policy interventions. When legislation is considered, the details of the approach are particularly important, such as the target population, and how the policy may change the food environment. In NYC, the news media coverage highlighted that obesity was a problem; however, the portion size cap approach was met with significant negative framing. In the Mid-Atlantic state, a vast majority of respondents believed that childhood obesity was a problem; however, very few agreed that it warranted a legislative response and only a slight majority supported a state SSB tax. Across US states, the topic addressed by state legislation was critical for its passage as food and beverage taxes were much less likely to be enacted relative to

laws increasing the availability of healthy foods or building a bike path. These results suggest that general perceptions of legislation as a tool for obesity prevention and control could be improved, especially legislation that is novel or that would restrict access to or raise the price of a food or beverage. Advocates seeking to promote these policy options should work to improve positive framing of these policies in the news media and broaden their appeal among the public by emphasizing the benefit of societal intervention as compared to an individual approach and considering different frames that illustrate the policy's effect on children.

The dissertation found that there are diverse opinions regarding the government's role in public health. In examining the New York City (NYC) portion size cap, the most prevalent frames were those opposing the policy because it was outside of the government, in this case, the NYC Board of Health's, roles and responsibilities. This may have reflected a public or policy opponent sentiment that the agency was acting as a "nanny state," and the legal arguments made that the Board exceeded its authority by acting in a legislative capacity. Voters in the Mid-Atlantic state were significantly more likely to support the proposed state penny-per-ounce SSB tax if they considered a societal intervention, such as a government action, preferable to making childhood obesity prevention the sole responsibility of parents. In state legislatures across the US, overall enactment of adult obesity prevention policies lagged behind the average enactment rate for any type of legislation. Overall, these findings suggest that policymakers both in legislative and regulatory agencies should consider how the public and the media portray their role in public health and the specific policies they introduce. It may be beneficial for policymakers to collaborate with stakeholders on a given policy issue, for example,

by working with organizations that represent those most affected by obesity-related disease. The resulting policy approaches may garner more support. In addition, a collaborative approach to policy development may be portrayed in the media and perceived by the public less like the solely government-driven and top-down tactic observed in this dissertation.

Overall, this study informs what is currently politically feasible in the US for addressing SSB consumption and obesity in adults through policy. It highlights some of the barriers and facilitators to the policy process and offers an important first step in understanding why few adult-focused obesity prevention policy interventions have been successfully enacted and implemented to date. The findings of this dissertation present an opportunity for researchers and advocates to improve framing within the news media and to the public, particularly in states and cities that have been less active in proposing obesity prevention legislation to date.

## **Strengths**

This dissertation has several strengths. The three studies provide novel evidence that each address a gap in the literature about the policy process for obesity prevention policy interventions directed toward an adult population. Previously, little was known regarding message framing, public opinion, and correlates of enactment for adult obesity prevention policies. The majority of the literature was focused on childhood obesity prevention policies, including studies of their effectiveness in school and community settings.<sup>1,2</sup> A similar evidence base on adult obesity prevention policies is not yet possible because few policies have been enacted. The Institute of Medicine noted in a

2010 Report, entitled *Bridging the Evidence Gap in Obesity Prevention*, the need to explore “...emerging and ongoing interventions as sources of practice-based evidence to fill the gaps in the best available evidence” (pg. 169).<sup>3</sup> Therefore, this study provides evidence upstream in the policy process for adult obesity prevention legislation to guide advocacy and research in this area and ultimately to be used alongside policy evaluation study findings. The dissertation’s contribution to the literature on the policy process is important because exploring data on the likelihood of legislation adoption is a key way to inform policy change.<sup>4</sup> Furthermore, message framing in the media and public opinion can influence policy decision-making.<sup>5-7</sup> Therefore, the current findings could inform future advocacy and research efforts to understand and influence the legislative process.

Understanding how the policy is framed in the news media, who supports it, or what may be associated with its enactment could be used by decision makers in conjunction with studies of policy effectiveness to facilitate the proposal of legislative and regulatory measures. Similarly, knowing where in the policy process these interventions may face barriers (e.g., negative media framing), may help advocates develop effective media advocacy campaigns. In addition, if advocates anticipate the framing and related public reaction from messaging around obesity risk factors, such as SSBs, they can proactively address concerns in their own framing strategy rather than waiting to respond to policy opponents.

The studies within this dissertation use diverse methodological approaches that examine data on three aspects of the policy process. Taken together, the use of news media content, a public opinion survey, and state legislation provide a wide-ranging exploration of the policy process. The three studies were able to draw on the variables

and frames examined in previous research to extend what was previously known about policies addressing obesity risk factors in children. The studies contribute new data on a novel policy in NYC, support for a state SSB tax, and various state obesity prevention bills targeting adults.

The focus of the studies at the local and state level is also a strength as public health innovation typically occurs in these jurisdictions as compared to the federal level.<sup>8</sup> Exploring the policy process at these levels of governance provide timely insights for those seeking to propose novel food and beverage policies in these settings.

### **Limitations**

In addition to the specific study limitations discussed in earlier chapters, this dissertation has several limitations. First, the design is hampered by the complexity of the mechanisms it aims to examine with analyses conducted at one point in time. All three studies offer a snapshot of the policy process that is theorized to take at least ten years to develop.<sup>9</sup> The current studies were not able to explore legislation development over the period of time it may take for a given policy idea to be proposed by a legislator or staff member through its enactment and implementation.

Second, there are several possible mechanisms for understanding and evaluating the policy process and exploring the media, public opinion, and a selection of bill- and state-level factors is only one approach. All three studies may exclude some important and unknown confounders of the relationships examined. For example, respondent employment status or body mass index could be associated with their opinion of a proposed tax and these variables were not included in the analysis. In addition, the

analysis of factors associated with state obesity prevention legislation enactment was limited to a certain set of variables by its use of publically available data. Furthermore, although the multi-level analysis examining state obesity prevention bills attempts to describe some of the factors explaining the relationship between legislative action and obesity, it is possible that there are several unmeasured confounders that are important for understanding this relationship. Some examples of potential unmeasured confounders of this relationship are the density of fast food outlets and the proportion of the state's economy attributed to agriculture or food production and distribution. It may be that legislators in states with a large food industry presence, e.g., soda distribution centers, are less willing to raise the price of soda.

Third, the local and state contexts examined in the three studies, particularly in New York City and the Mid-Atlantic state may not be generalizable to other areas within the US. For example, New York City is accustomed to attempting novel or more progressive public health approaches relative to other US local and state jurisdictions. The decision makers working in NYC during the time of the SSB portion size cap may be unique given the political will of the leadership to address health concerns through regulatory action. Therefore, the findings in NYC may not translate to other jurisdictions considering a similar policy in the US. In addition, this dissertation focused on the US population which may limit the generalizability of these findings to other country contexts.

Fourth, the three studies that comprise this dissertation primarily focused on policies that would change the food environment as a way to modify individual behavior by restricting access to unhealthy foods or beverages, or making a healthier option the

default. This type of policy intervention has been contrasted with those that work to encourage individual change, such as social marketing campaigns.<sup>10</sup> While the dissertation adopted an ecological perspective that considered influences on health behavior spanning multiple levels (e.g., environmental, interpersonal, and individual)<sup>11</sup>, the policy interventions examined were predominantly environmental changes. Policies that focused on environmental modifications emerged as the most difficult to enact within state legislatures and were explored in the analyses of the news media framing and public opinion. However, the potential benefit of other policy approaches is important to consider for future research.

Fifth, this dissertation focused on the role of government in policy interventions; however policy action is not limited to governments. Agencies, such as the World Health Organization, emphasize the need for a multi-sectoral response that includes the private sector, civil society, and governments.<sup>12</sup> This type of response may address some of the concerns that arose in the current dissertation regarding the role of government by engaging multiple stakeholders in developing solutions to the obesity epidemic.

## **Future Research**

Several areas of future research emerged from the findings of this dissertation. In the absence of implemented policy interventions, it is important to increase the amount of evidence on the policy process prior to enactment of regulatory or legislative change. Specifically, studies should continue to examine the drivers and barriers to policy adoption at local, state, and national levels to inform future policy debates. These may include both proximal (e.g., components of the law) and distal influences on the policy



process. This dissertation illustrates the benefit of exploring policy debates as a means to understand contextual factors that influence the course of events and inform work in other jurisdictions. Future studies could conduct similar analyses for other policy interventions. Advocates and researchers seeking to influence policy change would benefit from continuing to examine the political process during and shortly after policy interventions are proposed and implemented.

Future research should examine the role that the media and public opinion play in the policy process in regard to obesity prevention and control by conducting thorough evaluations of media advocacy campaigns. Practitioners should use the current study's findings to develop media advocacy and communication strategies that emphasize supportive framing of promising policy options to encourage public and decision maker support. Based on the findings of this dissertation, as well as previous research, testing messages that frame obesity as a societal concern that is not the individual's responsibility may increase legislation support.<sup>6, 13, 14</sup> During development of the media advocacy and communication campaign, an evaluation plan should be developed to assess the impact of the messages and strategy within an ongoing policy discussion. There will likely be several opportunities to test a campaign for promising and potentially unpopular policies as US states propose SSB taxes<sup>17</sup>, and New York City's newly elected leadership reconsiders the portion size cap.<sup>18</sup>

There remains a need in the literature for research on the effectiveness of obesity prevention policy interventions. When legislations and regulations are in place, it is critical to evaluate implementation fidelity and to evaluate their impact on health, as well as any potentially negative consequences of the intervention. As legislation is being

enacted in some jurisdictions (e.g., Berkeley SSB tax)<sup>19</sup>, it will be important to evaluate its effect on behavior and health outcomes in a timely manner and in a way that is accessible to advocates and policymakers in other jurisdictions considering similar measures.

More research is needed to examine how combining intervention types (e.g., policy, community, and school) may increase political feasibility relative to legislative options alone. While perhaps more methodologically challenging, examining the combined short and long-term outcomes of both legislative and community-based interventions to address obesity may help to increase support for the less popular legislative options. In other words, it may help to address concerns for how certain types of legislation (e.g., taxes) will restrict choices by increasing choices in another area, such as increasing the number of farmer's markets in a state or expanding physical activity options in schools. This type of intervention package should operate at multiple-levels (state, community, school), and it should be constructed based on the current evidence base. It may also be informative to examine how other public health epidemics, such as tobacco, have used educational and social marketing campaigns as a complement to potentially unpopular policies such as taxes, and smoke-free bars and restaurants (15). By creating a policy package comprised of evidence-based interventions found in this dissertation to be both popular and unpopular, the resulting proposed intervention package may be more politically feasible, as well as effective at reducing obesity risk factors.

Lastly, there is a substantial need in the literature for qualitative research on the obesity prevention policy process. The current study included a quantitative media

content analysis. Given the ideological debate happening among the public, studies that use a qualitative approach are warranted to examine the discourse around the role of government in health in the news media. It is also critical to understand in more depth the perspective of regulatory and legislative stakeholders, particularly those with contrasting points of view. For example, qualitative interviews in states with low policy action toward adult obesity could be used to explore the political debates within legislative and regulatory agencies regarding obesity legislation consideration and enactment. Some qualitative work has been conducted to understand childhood obesity policy decisions (e.g.,(16)). However, given the barriers to adult obesity prevention legislation highlighted in this dissertation, similar qualitative work focused on an adult population is warranted to explore the decision-makers' perspectives on policy barriers.

## **Conclusions**

As the prevalence of overweight and obesity in adults remains high, jurisdictions across the United States are considering policy interventions as a strategy to address the epidemic. The findings of this dissertation suggest that message framing in the news media, public opinion, and bill and state contextual factors can be important facilitators or barriers to policy success. This dissertation informs the work of advocates and researchers seeking to influence policy change targeting an adult population. Furthermore, the findings can guide policymakers in their selection of interventions that will be both feasible to enact, as well as effective in reducing obesity-related morbidity and mortality.

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19. Mandaro L. Nation's first soda tax is passed. *USA Today.* Available from: <http://www.usatoday.com/story/news/nation-now/2014/11/05/berkeley-passes-soda-tax/18521923/> . Accessed December 16, 2014.

## **CURRICULUM VITAE**

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## ELISABETH A. DONALDSON

### EDUCATION

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**Johns Hopkins Bloomberg School of Public Health, Baltimore, MD**

- PhD Candidate in Social and Behavioral Sciences

**Johns Hopkins Bloomberg School of Public Health, Baltimore, MD** *May 2008*

- Master of Health Science in Behavioral Sciences and Health Education
- Certificate in Health Communication

**Pennsylvania State University, University Park, PA** *May 2006*

- Bachelor of Science in Biobehavioral Health
- Minor in Health, Policy & Administration
- Schreyer Honors Scholar
- Graduated with Highest Distinction (top 2% of graduating class)

### SUMMARY

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- Passionate about supporting innovative and effective programs and policies to reduce the burden of chronic disease through research and evaluation.
- Over 5 years of experience leading research projects on tobacco control and food policy interventions with more than 3 years' experience in program management and grants monitoring and evaluation.

### EXPERIENCE

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**The Horizon Foundation**

*Research Fellow*

*June 2013-May 2014*

- Analyzed dietary behaviors, health status, and academic performance of 6<sup>th</sup> grade students in Howard County. Prepared a report for the Howard County Public School System and summarized findings to inform the Horizon Foundation's strategic funding of childhood obesity initiatives.
- Collected baseline data to evaluate Howard County's Executive Order on healthy beverage options in vending machines. Developed an evaluation plan to assess the policy's impact on beverage availability and machine sales.
- Analyzed public opinion survey data regarding proposed county and state policies and synthesized outcomes for strategic planning.

**The Schroeder Institute, American Legacy Foundation**

*Research Fellow*

*June 2013-Dec.2013*

- Conducted a systematic review of modeling techniques used to project tobacco use prevalence, health outcomes, and policy impact.

**Institute for Global Tobacco Control, Johns Hopkins Bloomberg School of Public Health**

*Research Program Manager*

*June 2008-Aug.2011*

- Directed operations of over 1 million USD in capacity building and training programs as part of the Bloomberg Initiative to Reduce Tobacco Use. Responsibilities included managing a team of four to implement the annual Global Tobacco Control Leadership and Certificate Programs which aim to build the capacity of leaders and researchers in low- and middle-income countries. Based on the Leadership Program's success, it was tailored for implementation in other regions around the world.
- Managed an Evaluation Technical Assistance Team as part of the Pfizer Foundation's Global Health Partnerships, a 47 million USD grant portfolio of 31 projects in cancer and tobacco control in 40 countries. Assisted with the design and implementation of the grants monitoring and evaluation strategy by conducting literature reviews, drafting and monitoring work plans and deliverables, and engaging in discussions with stakeholders at Pfizer Inc. and Pfizer Foundation. Provided ongoing technical support and training to the 31 grantees, including the development of a logic model and impact indicators for each grantee, guiding the selection of data sources to measure outcomes, and addressing implementation barriers with a focus on sustainability.
- Supervised a student research assistant and a full-time staff research assistant.
- Developed the tobacco control curriculum for a one-year diploma program in Health Promotion for local government officials in India in partnership with the Public Health Foundation of India.
- Collaborated in the development of a toolkit and web-based training on secondhand tobacco smoke monitoring; [www.shsmonitoring.org](http://www.shsmonitoring.org).
- Co-authored a successful \$300,000 USD grant from the Flight Attendants for Medical Research Institute Center for Excellence at Johns Hopkins University to develop and test interventions aimed at reducing secondhand tobacco smoke exposure in worksites and homes in Armenia and neighboring countries. Responsibilities included developing study and intervention protocols, questionnaires, and educational materials.

*Project Coordinator (Intern)*

*Aug.2006-May 2008*

- Collaborated in the development of a surveillance instrument and data collection system in partnership with the Framework Convention Alliance to monitor the implementation of the World Health Organization's Framework Convention on Tobacco Control.
- Drafted and edited grant proposals, manuscripts, reports, toolkits, and presentations for ongoing research projects and programs.



## **PUBLICATIONS**

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**Donaldson EA**, Cohen JE, Rutkow L, Villanti AC, Kanarek NF, Barry CL (2014). Public Support for a Sugar-Sweetened Beverage Tax and Pro-Tax Messages in a Mid-Atlantic US State. *Public Health Nutrition*, 28: 1-11.

Cohen JE, Yang J, **Donaldson EA** (2014). Impact of the Removal of Light and Mild Descriptors from Cigarette Packages in Ontario, Canada: Switching to “Light Replacement” Brand Variants. *Preventive Medicine*, 16(69C): 120-125.

Cobb C, Niaura RS, **Donaldson EA**, Graham AL (2014). Quit now? Quit soon? Quit when you’re ready? Insights about target quit dates for smoking cessation from an online quit date tool. *Journal of Medical Internet Research*, 16(2): e55.

Cohen JE, **Donaldson EA** (2013). A Framework to Evaluate the Development and Implementation of a Comprehensive Public Health Strategy. *Public Health*, 127 (8): 791-793.

**Donaldson EA**, Holtgrave DR, Duffin RA, Feltner F, Funderburk W, Freeman HP (2012). Patient navigation for breast and colorectal cancer in three community settings: An economic evaluation. *Cancer*, 118 (19): 4851-9.

**Donaldson EA**, Waters HR, Arora M, Varghese B, Dave P, Modi B (2011). A Cost-Effectiveness Analysis of India’s 2008 Prohibition of Smoking in Public Places in Gujarat. *International Journal of Environmental Research and Public Health*, 8(5): 1271-1286.

Apelberg BJ, Aghi M, Asma S, **Donaldson E**, Yeong CC, Vaithinathan R. Prevalence of Tobacco Use and Factors Influencing Initiation and Maintenance Among Women. In *Gender, Women and the Tobacco Epidemic*, World Health Organization: Geneva (May 31, 2010).

## **THESES:**

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### **Doctoral Dissertation**

*Obesity Prevention Policy Interventions for US Adults: Exploring Facilitators and Barriers*

### **Master of Health Science Thesis**

*Global Tobacco Control: The Role of Nongovernmental Organizations in Implementing the Framework Convention on Tobacco Control*

### **Undergraduate Honors Thesis**

*Biobehavioral Risk Factors of Tobacco Use Among College Students*

## PRESENTATIONS

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**Donaldson EA**, Cohen JE, Rutkow L, Villanti AC, Kanarek NF, Barry, CL. “Who supports taxes on sugar-sweetened beverages? Factors associated with support for taxes and pro-tax messages in a Mid-Atlantic US State.” **American Public Health Association**, Annual Meeting, November 2014, New Orleans, Louisiana.

**Donaldson EA**, Truant PL, Cohen JE. “News Media Framing of New York City’s Sugar-Sweetened Beverage Portion Size Cap Policy” **10<sup>th</sup> Annual Cancer Epidemiology, Prevention and Control Trainee Symposium Poster Session**, May 2014, Baltimore, Maryland.

Fairman S, **Donaldson E**, Pearson J, Zawistowski G, Niaura R, Villanti, A. “Simulation Modeling in Tobacco Control Research: A Systematic Review” **Society for Research on Nicotine and Tobacco (SRNT)**, Annual Meeting, February 2014, Seattle, Washington.

**Donaldson EA**, Yang J, Cohen JE. “Impact of the Removal of Light and Mild Descriptors from Cigarette Packages in Ontario, Canada: Switching to ‘Light Replacement’ Brands” **9<sup>th</sup> Annual Cancer Epidemiology, Prevention and Control Trainee Symposium Poster Session**, May 2013, Baltimore, Maryland.

**Donaldson E**. Presentation. “How Sweet It Is: Policies Aimed at Sugar-Sweetened Beverage Consumption in US Adults” **Cancer Research in Progress Seminar**, Johns Hopkins Bloomberg School of Public Health, February 2013, Baltimore, Maryland.

**Donaldson EA**, Khafagy AM, Olaolorun FM, Wei F. “Prenatal Exposure to Maternal Smoking and Risk of Overweight and Obesity in Children: Systematic Review and Meta-Analysis” **8<sup>th</sup> Annual Cancer Epidemiology, Prevention and Control Trainee Symposium Poster Session**, May 2012, Baltimore, Maryland.

Cohen J, **Donaldson E**. “Best Practices for Developing and Implementing A Comprehensive Tobacco Control Program” **15<sup>th</sup> World Conference on Tobacco Or Health**, March 2012, Singapore.

**Donaldson E**. Presentation. “Investing in Patient Navigation for the Medically Underserved” **American Psychosocial Oncology Society (APOS)**, Annual Meeting, February 2012, Miami, Florida.

Harutyunyan A, Movsisyan N, Petrosyan V, Petrosyan D, Hepp L, Avika-Tang E, **Donaldson E**, Stillman F. “Developing a model for smoke-free universities” **European Conference on Tobacco or Health**, Amsterdam, The Netherlands, March 2011.

Petrosyan D, Movsisyan N, Petrosyan V, Harutyunyan A, Hepp L, Avika-Tang E, **Donaldson E**, Stillman F. “Smoke-free hospitals: Determinants of success” **European Conference on Tobacco or Health**, Amsterdam, The Netherlands, March 2011.

**Donaldson E**. Presentation. “Evaluating the Cost-Effectiveness of Smokefree Legislation in Gujarat, India: Progress and Opportunities” **Institute for Global Tobacco Control**

**Research Symposium**, Johns Hopkins Bloomberg School of Public Health, November 2010, Baltimore, Maryland.

Stillman F, Movsisyan N, Hepp L, Avila-Tang E, **Donaldson E**, Petrosyan V, Torrey C, Yuan J. “Secondhand Smoke Exposure in Hospitals and Universities in Armenia” **Society for Research on Nicotine and Tobacco (SRNT)**, Annual Meeting, February 2010, Baltimore, Maryland.

**Donaldson E**. Presentation. “Assessing the Needs of the Global Tobacco Control Community: Results of the 2<sup>nd</sup> Global Needs Assessment” **14<sup>th</sup> World Conference on Tobacco Or Health**, March 2009, Mumbai, India.

Stillman F, Movsisyan N, Petrosyan V, Avila-Tang E, **Donaldson E**, Hepp L, Breyse P. “Epidemiology and Intervention Research for Tobacco Control in Armenia” **14<sup>th</sup> World Conference on Tobacco Or Health**, March 2009, Mumbai, India.

Wipfli H, **Donaldson E**, Sillman F. Presentation. “Strengthening Local Capacity through International Research Networks. **American Public Health Association**, Annual Meeting, October 2008, San Diego, California.

**Donaldson E**, Stillman F, Skinner A. “The Role of Civil Society in Monitoring the Framework Convention on Tobacco Control” **Society for Research on Nicotine and Tobacco (SRNT)**, Asian Regional Conference, October 2008, Bangkok, Thailand.

**Donaldson E**, Cooke C. Presentation. “Making Your Sexual Health a Priority: Don't Ignore it. Prevent it. Safer Sex Party” **Pennsylvania Black Conference on Higher Education: Robert D. Lynch Student Leadership Development Institute**, October 2005, Altoona, Pennsylvania.

Kennedy S, **Donaldson E**, Cooke C. “Making Your Sexual Health a Priority: Don't Ignore it. Prevent it Campaign Report” **National Association of Student Personnel Administrator’s Conference**, November 2004, Tampa, Florida

Kennedy S, **Donaldson E**, Cooke C. “Making Your Sexual Health a Priority: Don't Ignore it. Prevent it Campaign Report” **American College Health Association**, Annual Meeting, June 2004, New Orleans, Louisiana.

## **AWARDS & ACTIVITIES**

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- 2012-2015 – National Cancer Institute Cancer Epidemiology, Prevention, and Control Training Fellowship; T32 CA009314
- 2012-2014 –Center for a Livable Future- Lerner Fellowship
- 2013-2014 –President, The Revels Condominium Association Board
- 2012 Journal Reviewer, *Cancer Epidemiology, Biomarkers & Prevention*

- 2012 & 2013 Journal Reviewer, *Journal of Public Health Management & Practice*
- 2013 Journal Reviewer, *American Journal of Public Health*
- 2013 Conference Abstract Reviewer, American Public Health Association's Annual Meeting
- 2011- 2014 - American Public Health Association Member
- 2009-2013 - President and Past President of the Pennsylvania State University Biobehavioral Health Department Alumni Board
- 2013 Teaching Assistant for Policy Interventions for Behavior Change course, Johns Hopkins Bloomberg School of Public Health
- 2012 Teaching Assistant for Epidemiology of Tobacco Control course, Johns Hopkins Bloomberg School of Public Health
- 2010 Teaching Assistant for Tobacco Control Leadership course, Johns Hopkins Bloomberg School of Public Health
- 2009 and 2010 Teaching Assistant for Advanced Methods in Global Tobacco Control course, Johns Hopkins Bloomberg School of Public Health
- 2008-2009 -Pennsylvania State University College of Health and Human Development Alumni Mentoring Program
- 2006 John W. White Graduate Fellowship from the Pennsylvania State University
- 2006 Department of Biobehavioral Health Student Marshal for the Pennsylvania State University College of Health and Human Development Spring Commencement Ceremony
- 2006 College of Health and Human Development Alumni Recognition Award for Student Excellence in Biobehavioral Health
- 2005 John W. Oswald Student Achievement Award to recognize a graduating senior who has provided outstanding leadership in the area of social services/student government
- 2004 Sylvia Stein Memorial Space Grant Scholarship from NASA's PA Space Grant Consortium

## **ADDITIONAL SKILLS**

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Advanced proficiency in Stata. Intermediate proficiency in ArcGIS. Familiarity with R, Mplus, and SPSS.